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1986
PERFORMANCE REPORT

WATER QUALITY SECTION



Ontario

Ministry
of the
Environment

G. C. RONAN, Director
Laboratory Services Branch

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1986
PERFORMANCE REPORT
WATER QUALITY SECTION

W.M. Wright (ed.)
Water Quality Section
Laboratory Services Branch
Ministry of the Environment

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ACKNOWLEDGEMENT

This report is dedicated to the technicians of the Water Quality Section who, in the pursuit of quality data for their clients, performed the numerous analysis summarized in this report. The magnitude of this task becomes apparent when one realizes that each datum required analysis, graphical representation, evaluation and, in some cases, transfer to a microcomputer. All of this was accomplished in addition to producing 869,000 results for clients.

and

We gratefully acknowledge the contribution of Laurie McVicar, who prepared the performance reports.

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Quality Control Program

The Water Quality Section of the Ministry of the Environment, Laboratory Services Branch is responsible for analysis of water quality parameters on a large number of samples. By using suitably sensitive instrumentation and methodologies in conjunction with carefully planned and monitored quality assurance programs, the Water Quality Section is able to maintain a high standard of analytical performance. This performance is certified through regular participation in interlaboratory round-robins. While results on these round-robins are not included in this report, they are available on request. This report does provide an outline of the Quality Control program, and a summary of performance data for 1986.

The major objective of the Quality Control program is to ensure immediate detection and correction of unacceptable analytical performance. In practice, the activities are divided into continual checks of basic analytical tools such as chemicals, water purity, containers, instrumentation, calibration and recovery.

The quality control program for chemicals involves the purchase of high purity materials and regular analysis of these chemicals for contamination. An understanding of their shelf life and health effects is a vital part of this program. Distilled and deionized, distilled water sources are monitored daily for conductivity and dissolved organic carbon. Lines carrying these water supplies are inspected regularly and replaced when necessary. Stability studies for all solutions are conducted regularly and the data are utilized to specify shelf-life in method descriptions.

Sample containers, filters, glassware and all other equipment used in the collection and analysis of samples are checked for leaching, adsorption and contamination. The publication *"A Guide to the Collection and Submission of Samples for Laboratory Analysis"* (1985) contains recommendations for sample containers, preservatives and sampling techniques.

Calibration is achieved by using standards covering the analytical range, and is performed before the analysis commences. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling and preparation as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, one or more of the following checks is performed: calibration, blank, recovery or potential interferences. To obtain duplicate data, the first aliquots of samples are analyzed early in the run. The second aliquots are analyzed later in the same run. In addition, calibration standards and blanks are analyzed periodically throughout the day to control sensitivity and baseline drift respectively.

Calibration Control

The calibration is controlled by a minimum of two control standards and a long term blank which are made up and maintained independently of the calibration standards. The system is not calibrated with these solutions. The long term blank is deionized, distilled water and any reagent chemicals used in the pretreatment of samples. Control standards are prepared less frequently than calibration standards and errors in calibration standards can be detected. Overlapping analysis on new solutions of control standards assure that errors in their preparation are detected.

When the control standards are analyzed, their sum and difference are plotted, versus time, on a chart and used immediately to determine whether the calibration process is in control. The control limits, against which the daily values are compared, are determined from previous data. In general, the daily values are allowed to vary by ± 2 to 5% and ± 1 to 3% of full scale for the sum and difference respectively. If either the sum or the difference is out of control, the system is stopped, corrective action taken and the control samples are re-analyzed. This cycle is repeated until the system is brought within control limits.

The standard deviations of the control standards are used to estimate the between run standard deviation (S) and the within run standard deviation (S_w). Values for S and S_w are calculated as follows:

$$2S_w^2 = (S_{A-B})^2$$

$$2S^2 = (S_A)^2 + (S_B)^2$$

Where

S_A = standard deviation of control sample A

S_B = standard deviation of control sample B

S_{A-B} = standard deviation of difference for
control samples A and B

N.B. If a second range is employed for one test, more control standards are used because, in many systems, the between run standard deviation may be concentration dependent.

For a detailed description of the control standard process, refer to references 1, 2, 3 and 4 in the bibliography.

Recovery Checks

In methods where sample preparation, such as digestion or extraction, is required, a recovery check, suitable to that system, is required to estimate the efficiency of the pretreatment. These solutions are not used to calibrate the instrument, but corrections for the blank and matrix effects are estimated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm 15\%$ of their expected values and the average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

Sensitivity Checks

Any change in the sensitivity of the instrumentation, over the period of analysis, is monitored by analyzing samples of a high standard periodically. Baseline drift is also recorded by periodic analysis of samples which do not contain any of the analyte. In most cases, this is deionized, distilled water but the matrix may be adjusted to correspond to sample pretreatment. The frequency of these check samples is determined from historical data for each analytical system.

Interference Checks

Interference checks are run on any test where a material may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards, to minimize the interferences, are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked checks are not performed on a routine basis.

Duplicate Data

Natural samples are selected for non-adjacent, within-run duplicate analysis. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within a short period of time, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

For this performance report, the observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is then calculated for each of these spans. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev.

$$S_1 = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{n-1}}$$

Std. Dev. of Duplicates

$$S_2 = \sqrt{\frac{\sum_{i=1}^n (x_1 - x_2)_i^2}{2n}}$$

Where

S_1 = sample standard deviation

S_2 = duplicate difference standard deviation

n = number of data

\bar{x} = mean of data

x_i = i^{th} result

$(x_1 - x_2)_i$ = difference of the i^{th} duplicate

FORMAT FOR PERFORMANCE REPORT

The types of samples analyzed in the Water Quality Section include ground water, surface water, sewage, industrial waste, leachates, soils, soil extract, drinking water and precipitation. The Laboratory Information System (LIS) is a centralized computer system which routes samples to a specific workstation and receives results to format into reports.

There is a performance report for each test. Information is provided to assist the reader in identifying the data which is appropriate to the various sample types and classes. The performance reports consist of a general summary sheet for each parameter, followed by one or more sheets of tabulated data and a plot of control standards, recovery checks and duplicate results, where applicable. The remainder of this section outlines the type of information which is included in the individual performance reports.

SUMMARY SHEET

TITLE:

The name of the parameter in the summary.

IDENTIFICATION:

Laboratory:	Where the test is performed on the sample types listed.
LIS Test Name Code:	LIS code used to request analysis.
Workstation Code:	LIS code for workstation where sample is routed.
Method Code:	LIS code for the analytical procedure.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Units in which the results are reported.
Unit Code:	LIS code for the units.
Supervisor:	Supervisor responsible for the laboratory.
Sample Type/Matrix:	The various sample types that can be routed to the workstation.

SAMPLING:

A brief description of the type of bottle to use, preservatives (if applicable) and minimum volume of sample required. Any sample preparation, which must be performed in the field, is also given.

SAMPLE PREPARATION:

Sample preparation techniques which must be performed at the laboratory before analysis.

ANALYTICAL PROCEDURE:

A brief description of the analytical method used to test for the parameter. For detailed method descriptions, refer to reference 4 in the bibliography.

INSTRUMENTATION:

Instrumentation, used to perform the test, is given. A detailed description can be found in reference 5. Reference to automated continuous flow systems consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Use of microcomputers, to control operation of analytical equipment and/or data acquisition, is identified.

REPORTING:

The maximum number of significant figures used to report the result. The calculated W value is reported when no detectable response of the instrumentation is observed. Results, which are less than the T value, are indicated by the <T remark. For a further explanation of the W and T significance, refer to appendix A.

CALIBRATION:

The number of different standards used to calibrate the analytical system daily.

CONTROLS:

The calibration control, recovery control and drift control standards, that are used, to ensure the proper operation of the system and may include the frequency of analysis.

MODIFICATIONS:

Modifications to the test since the publication of "*Handbook of Analytical Methods for Environmental Samples*" (HAMES) (reference 5).

NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

PERFORMANCE DATA

For each performance report, there will be at least one tabulated data page.

TITLE:

The name of the parameter.

QUALITY CONTROL DATA FROM/TO:

The dates of the collection period for the data.

LAB:

The laboratory in which the data were collected.

ANALYTICAL RANGE:

The analytical range, in concentration units, is stated from the detection criterion to 100% of full scale. A blank, or N/A, for the detection criterion indicates that insufficient data were available in the lowest range of duplicates for direct calculation.

CALIBRATION CONTROL:

A table for the calibration control standards. The within run standard deviation (S_w), the between run standard deviation (S), the ratio S/S_w and the ranges for acceptance of the A+B and A-B values are shown.

RECOVERIES:

A table for the recovery control standards.

DUPLICATES:

A table for the within run data of the duplicate aliquots. The data are sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) by the mean concentration, multiplied by 100, for each concentration span.

DETECTION CRITERION:

The detection criterion, which is based on the lowest span of duplicate data, is calculated by rounding the standard deviation to the next lower 1, 2 or 5 digit and multiplying by 5.

OTHER CHECKS:

Data for any other checks which may be used.

QUALITY CONTROL GRAPHS

For each data page there is one quality control graph page.

TITLE:

The name of the parameter and appropriate units.

DATE FROM/TO:

Dates on plot correspond to dates on performance data page.

CALIBRATION CONTROL:

Calibration control standard sums and differences are plotted on a horizontal scale for the period of data collection. the vertical scale is centred on the expected value. Control limits ($\pm CL$) were chosen from previous analytical performance when available. Frequent data outside the limits, indicate a system out of control or excessively close limits. An asterisk marks each point more than 15% outside the limits.

RECOVERY PLOTS:

Where recovery checks are performed, the highest and lowest concentrations are plotted. The horizontal scale is identical to the calibration control plots. The vertical scale is centred on the expected value.

DUPLICATE PLOTS:

All duplicate results, for the period, are summarized in a three segment plot. Each segment is a portion of the full scale calibration. These segments may not correspond to the spans listed in the PERFORMANCE DATA page. In each concentration category, the absolute differences between duplicate samples are grouped to determine their frequency. The relative number of occurrences, in each range, are plotted as a percentage of the total in three frequency histograms. As the histogram ranges are calculated with respect to full scale, they cover the same span of absolute differences in concentration for each of the graphs, and the distribution can, therefore, be compared directly.

PERFORMANCE SUMMARIES

*** ACIDITY - GRAN ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	16/08/82
LIS Test Name Code:	ACDG	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	063801
Method Code	: 0906T6	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Precipitation, Groundwaters			

SAMPLING:

Quantity Required: 25 mL
Container : Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.01 N sodium hydroxide to a pH endpoint of <8.3. The titrant is standardized against 0.0005N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subject to Gran analysis.
N.B. pH and Total acidity are determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5* T value: 25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus 2 standards, eg, QCA
Drift : 2 standard buffers -4 times daily.

NOTE:

DISCONTINUED AS OF 21/07/86. SAMPLES TRANSFERRED TO PHACD WORKSTATION.

ACIDITY - GRAN
QUALITY CONTROL DATA FROM 09/01/86 TO 18/07/86

Lab: Dorset

Analytical Range: 25 to 1000 ueq/L as H

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	37	500	498	-2	7.8
b :	37	200	202	2	5.0
a+b :	37	700	700	0	10.1
a-b :	37	300	296	-4	8.4

s.d.(AB): Sw(within run): 5.8 S(between runs): 6.6 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

655 to 745 for A+B
270 to 330 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	5	0.0 - 40.0	3.65	10.8
	43	40 - 100	7.6	11.2
	44	100 - 250	13.8	9.0
	2	250 - 500	53.0	14.5
	4	500 - 1000	63.2	9.7
	98	Overall	18.2	N/A

STANDARD DEVIATION (s.dupl): 7.60

W value: 5

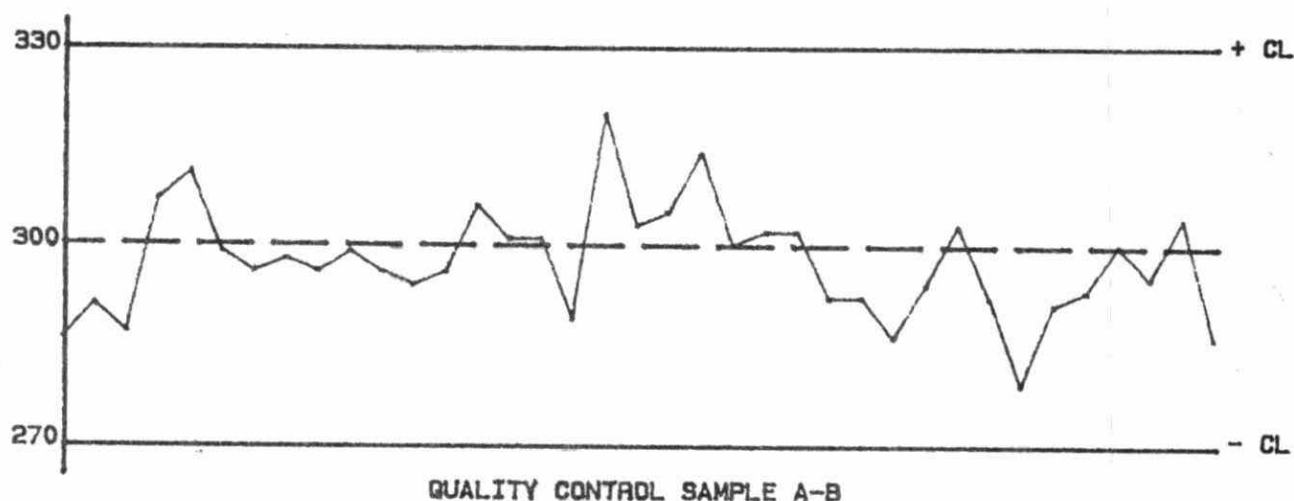
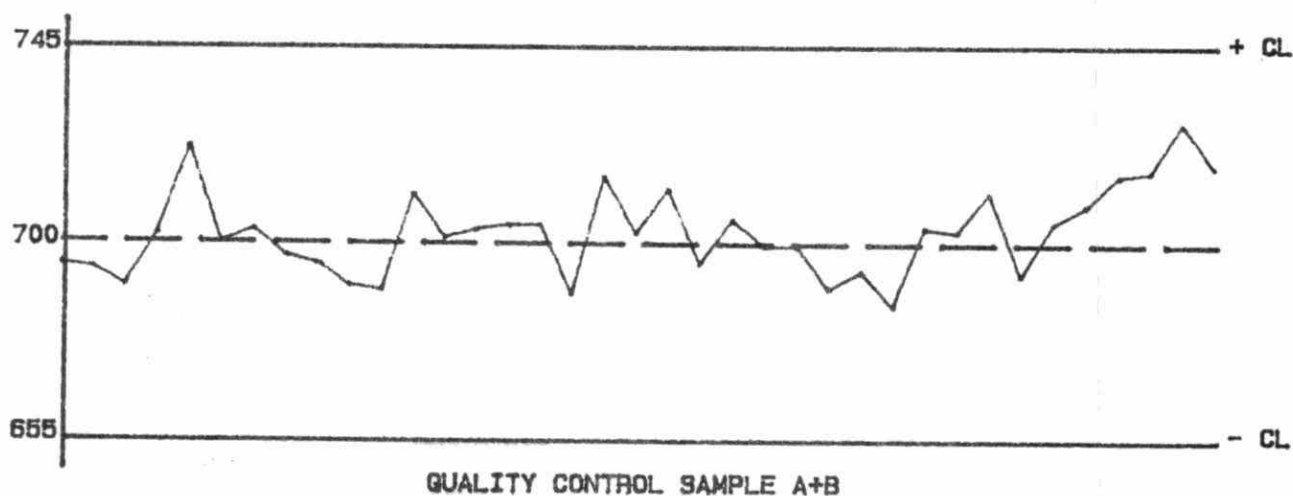
T value: 25

OTHER CHECKS:

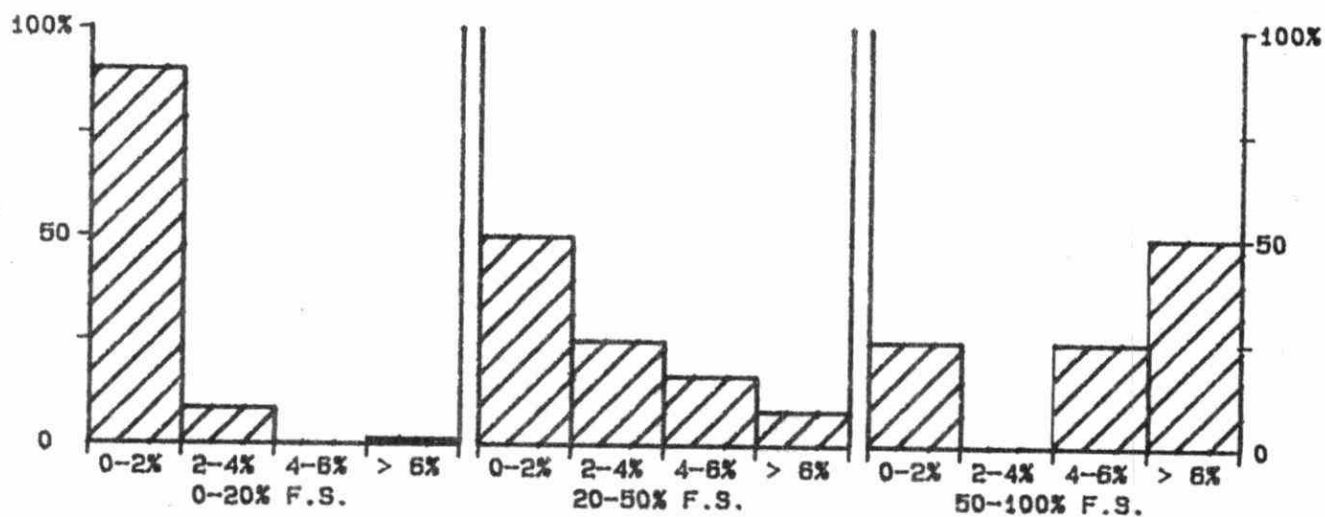
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	32	6.73	3.790

QUALITY CONTROL GRAPHS ACIDITY - GRAN (UEQ/L AS H)

FROM: 09/01/86
TO: 18/07/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 UEQ/L AS H

*** ACIDITY - GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	01/08/82
LIS Test Name Code:	ACDG	Units	: ug/L as H
Work Station Code	: PHACD	Unit Code	: 063801
Method Code	: 001BT5	Supervisor	: P. Campbell
Sample Type/Matrix: Precipitation, Throughfall, Stemflow			

SAMPLING:

Quantity Required: 15 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01N sodium hydroxide to a pH >8.3. The titrant is standardized against 0.0005N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.
N.B. pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : LTBL (expected result is 16.6 ueq/L as H) plus two standards, eg, QCA

MODIFICATIONS:

01/08/82 -QC program was expanded to include Gran acidity for which the reporting units are ug/L as H.
01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.
01/06/84 -Normality of KHP used to standardize the base was reduced from 0.005N to 0.0005N
30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

ACIDITY - GRAN
QUALITY CONTROL DATA FROM 03/01/86 TO 22/12/86

Lab: Titration

Analytical Range: 5 to 1000 ueq/L as H

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	125	500	501	1	6.3
b :	125	200	206	6	4.0
a+b :	125	700	707	7	9.7
a-b :	125	300	295	-5	4.1

s.d.(AB): Sw(within run): 2.9 S(between runs): 5.3 S/Sw: 1.82

On any given day the calibration is accepted if the values obtained lie within the ranges:

655 to 745 for A+B
270 to 330 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	94	0.0 - 40.0	1.74	6.9
	194	40 - 100	1.8	2.7
	59	100 - 250	2.7	2.0
	2	250 - 500	3.0	0.9
	1	500 - 1000	N/A	N/A
	350	Overall	2.0	N/A

STANDARD DEVIATION (s.dup1): 1.74

W value: 1

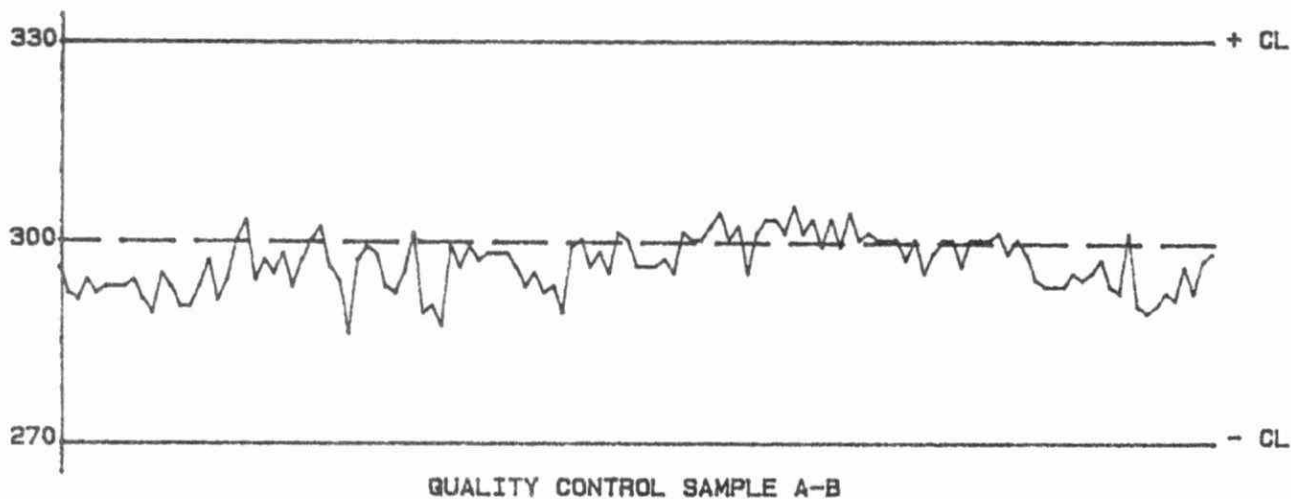
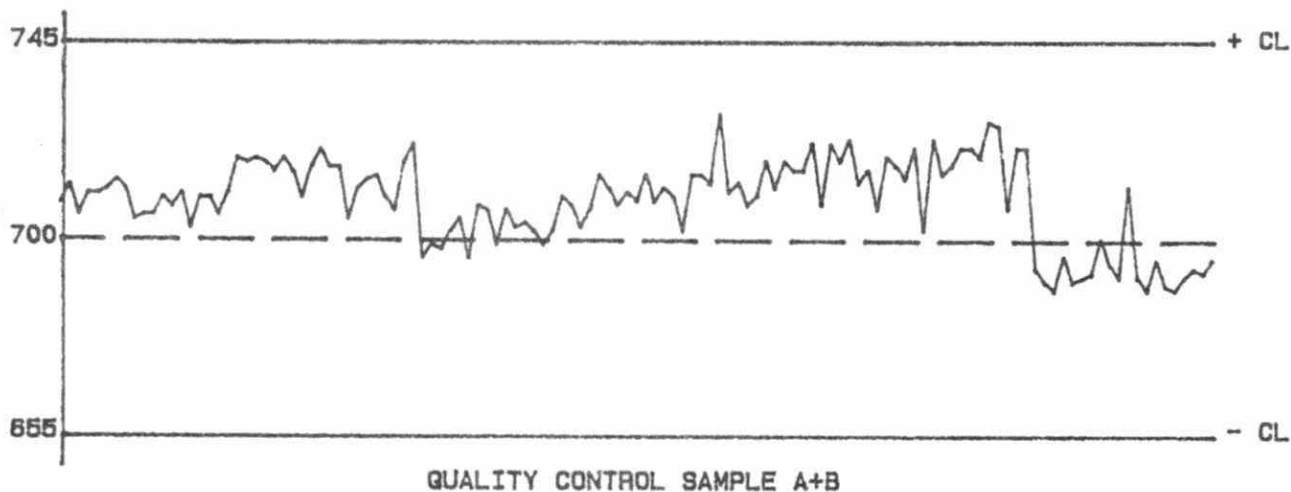
T value: 5

OTHER CHECKS:

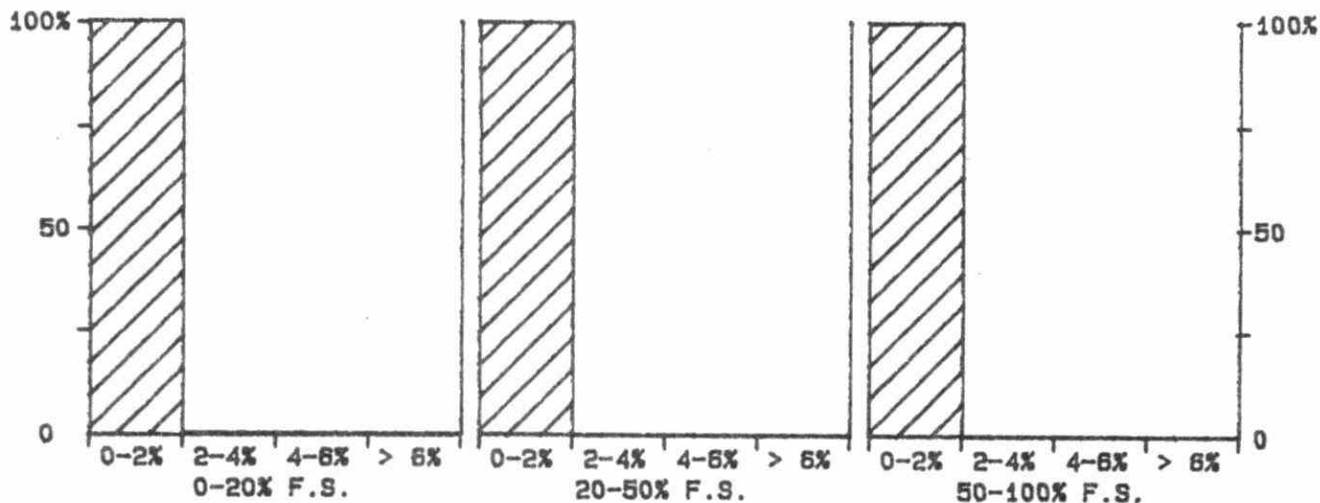
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	117	13.28	2.883

QUALITY CONTROL GRAPHS ACIDITY - GRAN (UEQ/L AS H)

FROM: 03/01/86
TO: 22/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 UEQ/L AS H

*** ACIDITY - TOTAL FIXED ENDPOINT (TFE) ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	16/08/82
LIS Test Name Code:	ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	064815
Method Code	: 0906T3	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Precipitation, Groundwaters			

SAMPLING:

Quantity Required: 25 mL
Container : Amber polyethylene bottle filled to the brim/ screw caps with cone-shaped liners are preferred

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.01 N sodium hydroxide to a pH endpoint of 8.3. The titrant is standardized against 0.005N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. N.B. pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2* T value: 1

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus 2 standards, eg, QCA
Drift : 2 standard buffers -4 times daily.

NOTE:

DISCONTINUED AS OF 21/07/86. SAMPLES TRANSFERRED TO PHACD WORKSTATION.

ACIDITY - TOTAL FIXED ENDPOINT
QUALITY CONTROL DATA FROM 08/01/86 TO 28/07/86

Lab: Dorset

Analytical Range: 1 to 50.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	41	25.00	25.01	0.01	0.366
b :	41	10.20	10.20	0.00	0.284
a+b :	41	35.20	35.21	0.01	0.515
a-b :	41	14.80	14.81	0.01	0.405

s.d.(AB): SW(within run): 0.286 S(between runs): 0.328 S/SW: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.85 to 37.45 for A+B
 13.30 to 16.30 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
4	0.00 - 2.00	0.103	6.8
36	2.00 - 5.00	0.276	8.0
43	5.00 - 10.00	0.636	9.4
13	10.0 - 25.0	1.16	9.1
3	25.0 - 50.0	3.39	10.3
99	Overall	0.85	N/A

STANDARD DEVIATION (s.dupl): 0.276

W value: 0.2

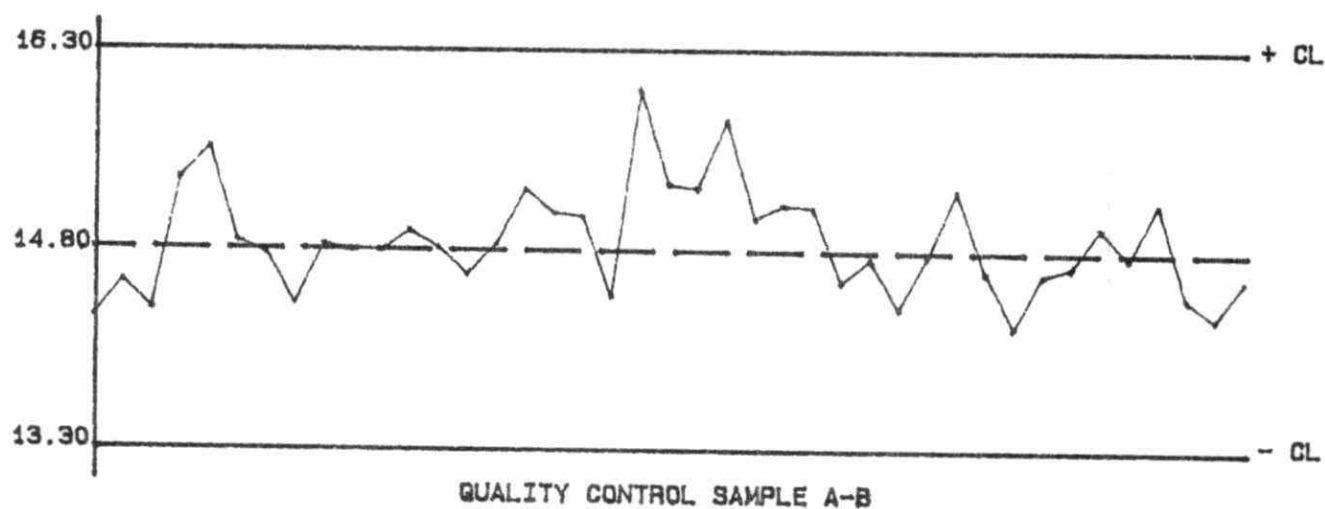
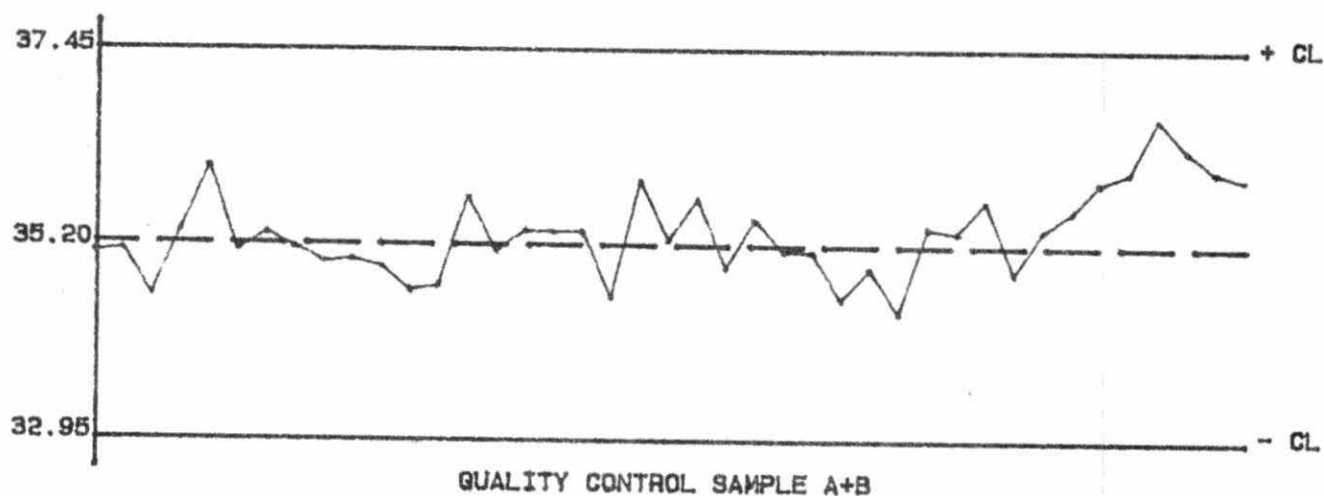
T value: 1

OTHER CHECKS:

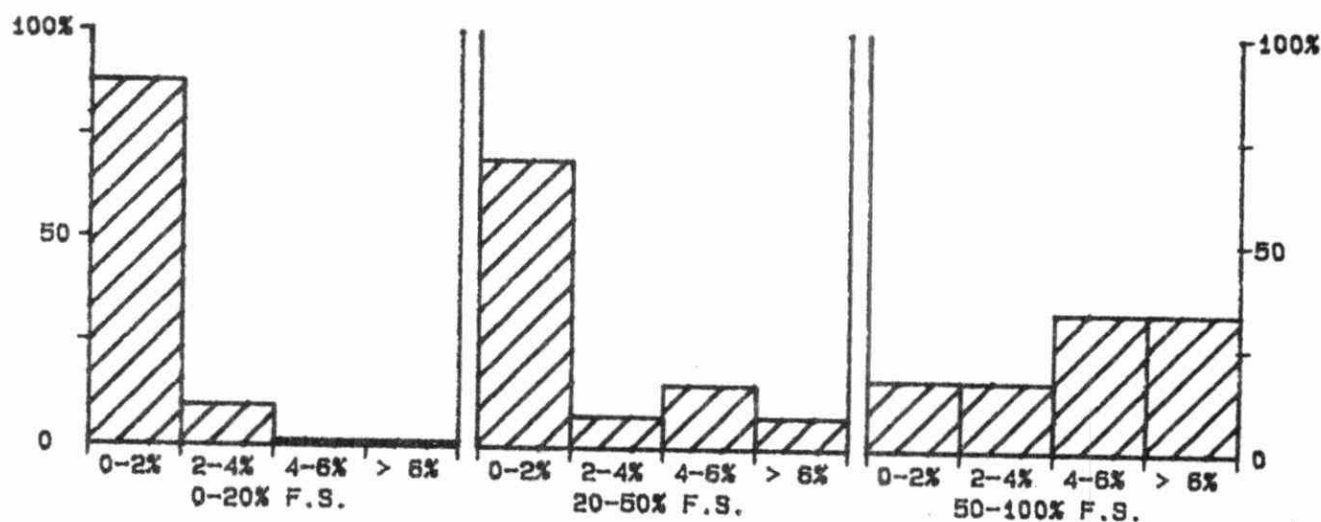
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	38	0.30	0.288

QUALITY CONTROL GRAPHS ACIDITY - TOTAL FIXED ENDPOINT (MG/L AS CaCO₃)

FROM: 09/01/86
TO: 28/07/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS CaCO₃

*** ACIDITY - TOTAL FIXED ENDPOINT (TFE) ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	01/05/79
LIS Test Name Code:	ACDT	Units	: mg/L as CaCO ₃
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: P. Campbell
Sample Type/Matrix : Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes, (by special request: Industrial Waste, Sewage)			

SAMPLING:

Quantity Required: 15 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01N sodium hydroxide to a pH endpoint of 8.3. The titrant is standardized by titrating 0.0005N potassium hydrogen phthalate to the pH endpoint of 8.3. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. N.B. pH and Gran acidity are determined simultaneously

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : LTBL plus two standards, eg, QCA

MODIFICATIONS:

01/04/82 -Sample volume was decreased from 100.0 to 10.0 mL.
01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.
01/06/84 -Normality of KHP used to standardize base was reduced from 0.005N to 0.0005N.
30/05/86 -Direct Computer Input (DCI) to the Laboratory Information System (LIS) was introduced.

ACIDITY - TOTAL FIXED ENDPOINT (TFE)
QUALITY CONTROL DATA FROM 03/01/86 TO 22/12/86

Lab: Titration

Analytical Range: 0.25 to 100.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	125	24.9	25.1	0.2	0.32
b :	125	10.7	10.4	-0.3	0.21
a+b :	125	35.6	35.5	-0.1	0.50
a-b :	125	14.2	14.7	0.5	0.20

s.d.(AB): SW(within run): 0.14 S(between runs): 0.27 S/SW: 1.91

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.6 to 38.6 for A+B
12.2 to 16.2 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	89	0.00 - 2.00	0.078	5.8
	193	2.00 - 5.00	0.091	2.6
	57	5.00 - 10.00	0.104	1.5
	4	10.0 - 25.0	0.13	0.9
	2	25.0 - 100.0	0.95	1.5
	345	Overall	0.12	N/A

STANDARD DEVIATION (s.dup1): 0.078

W value: 0.05

T value: 0.25

OTHER CHECKS:

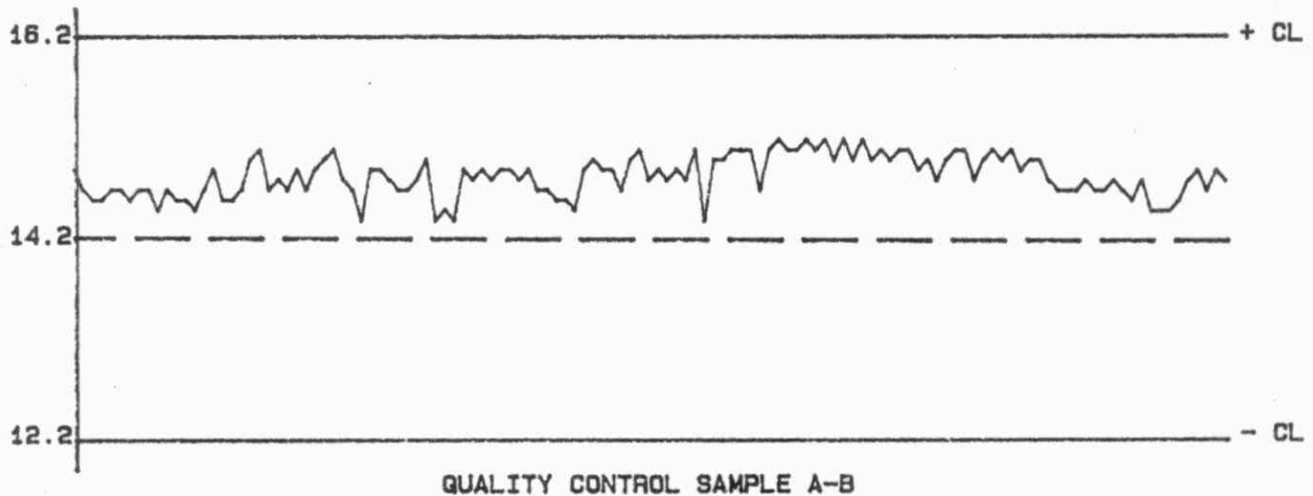
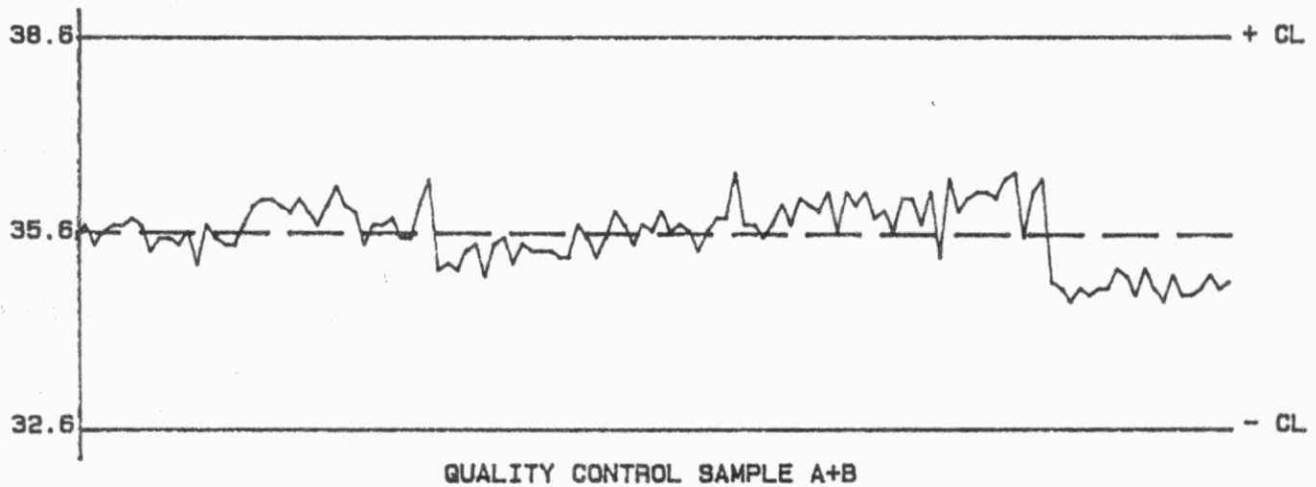
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	119	0.76	0.179

QUALITY CONTROL GRAPHS

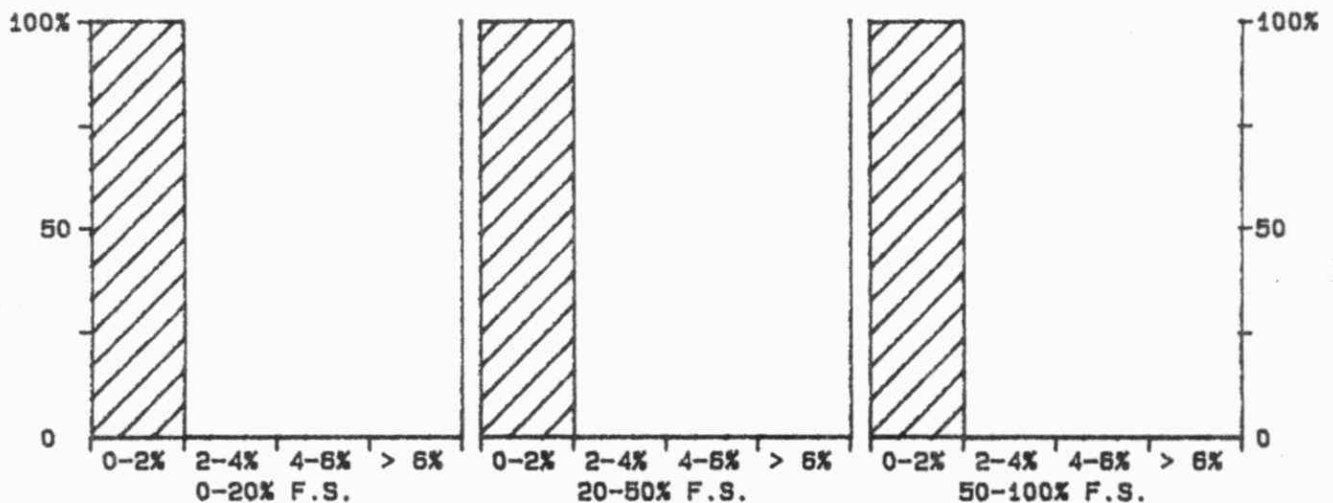
ACIDITY - TOTAL FIXED ENDPOINT (TFE) (MG/L AS CaCO_3)

FROM: 03/01/86

TO: 22/12/86



--- EXPECTED VALUE
 --- CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 100 MG/L AS CaCO_3

*** ALKALINITY - GRAN ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	26/07/79
LIS Test Name Code:	ALKTI	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation, Groundwaters			

SAMPLING:

Quantity Required: 150 mL
Container : Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH < 3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.
N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 0.5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus 2 standards, eg, QCA.
Drift : 2 standard buffers -4 times daily.

ALKALINITY - GRAN
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 0.5 to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	238	20.00	20.01	0.01	0.411
b :	238	5.00	4.79	-0.21	0.198
a+b :	238	25.00	24.80	-0.20	0.560
a-b :	238	15.00	15.23	0.23	0.320

s.d.(AB): Sw(within run): 0.226 S(between runs): 0.323 S/Sw: 1.43

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.88 to 26.12 for A+B
14.25 to 15.75 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	251	0.00 - 2.00	0.136	14.8
	284	2.00 - 5.00	0.095	2.8
	72	5.00 - 10.00	0.725	10.2
	14	10.00 - 25.00	0.893	6.5
	621	Overall	0.301	N/A

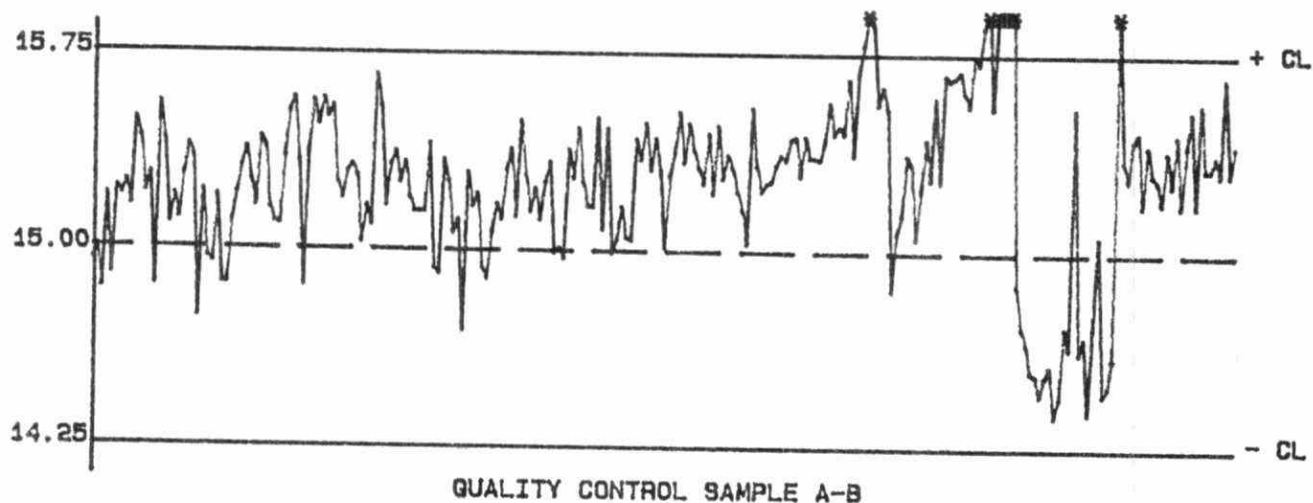
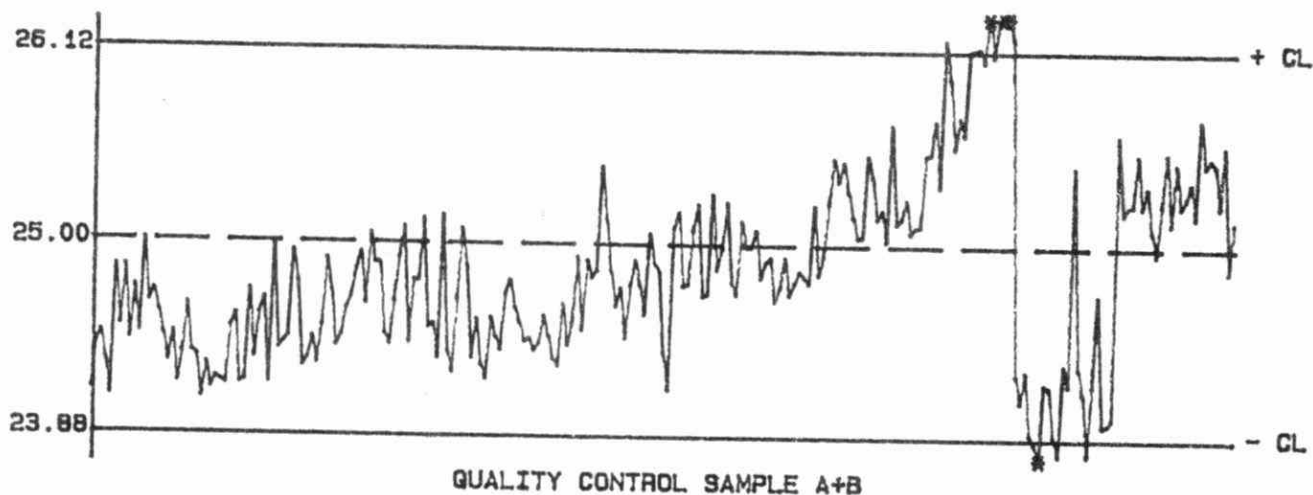
STANDARD DEVIATION (s.dup1): 0.136 W value: 0.1 T value: 0.5

OTHER CHECKS:

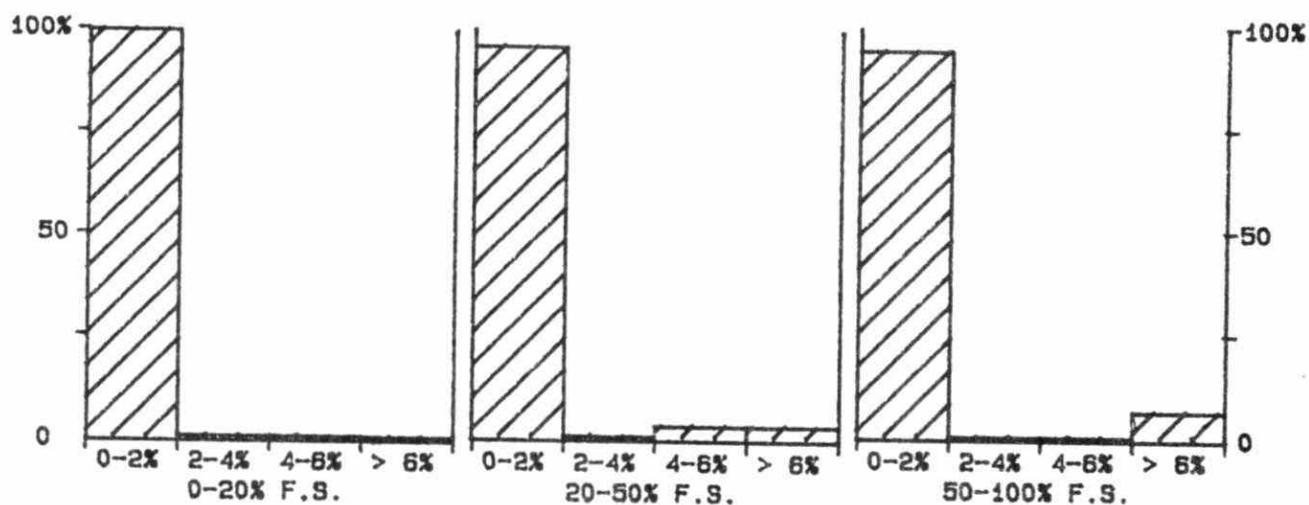
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	230	-0.31	0.236

QUALITY CONTROL GRAPHS ALKALINITY - GRAN (MG/L AS CaCO_3)

FROM: 03/01/86
TO: 31/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS CaCO_3

*** ALKALINITY - GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	08/07/80
LIS Test Name Code:	ALKTI	Units	: mg/L as CaCO3
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: P. Campbell
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents			

SAMPLING:

Quantity Required: 50 mL
Container : Polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH < 4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.

N.B. pH, total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.1 T value: 0.5

CALIBRATION:

2 standard buffers covering the pH range 4 to 7.

CONTROLS:

Calibration: LTBL plus two standards, eg, QCA.

Drift : In run standards throughout the run (diluted tap water 20% V/V).

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS - River Automated Titration System - designed for the determination of conductivity, pH, alkalinity - total fixed endpoint and alkalinity - Gran. The system is microcomputer controlled with data reduction and direct computer input (DCI) capabilities.

ALKALINITY-GRAN
QUALITY CONTROL DATA FROM 03/01/86 TO 24/12/86

Lab: Titration

Analytical Range: 0.5 to 25.00 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	108	10.00	9.85	-0.15	0.192
d :	108	2.50	2.46	-0.04	0.118
c+d :	108	12.50	12.32	-0.18	0.258
c-d :	108	7.50	7.39	-0.11	0.186

s.d.(CD): Sw(within run): 0.132 S(between runs): 0.159 S/Sw: 1.21

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.75 to 16.25 for C+D
5.00 to 10.00 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	0	-2.00 - 0.00	N/A	N/A
	7	0.00 - 2.00	0.129	12.5
	20	2.00 - 5.00	0.123	3.7
	8	5.00 - 10.00	0.163	2.2
	31	10.00 - 25.00	0.185	1.1
	66	Overall	0.160	N/A

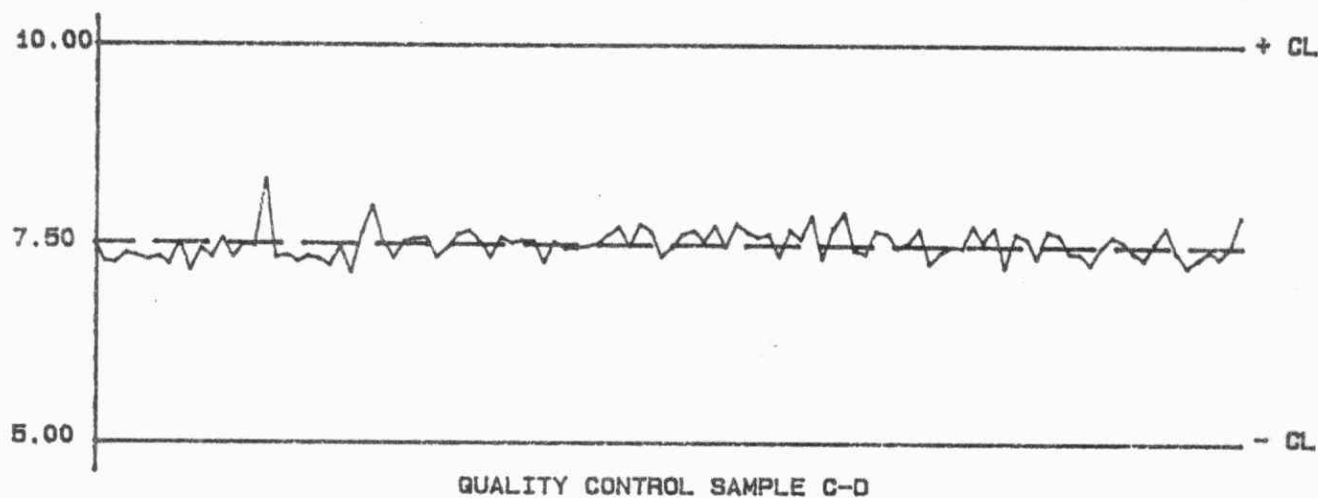
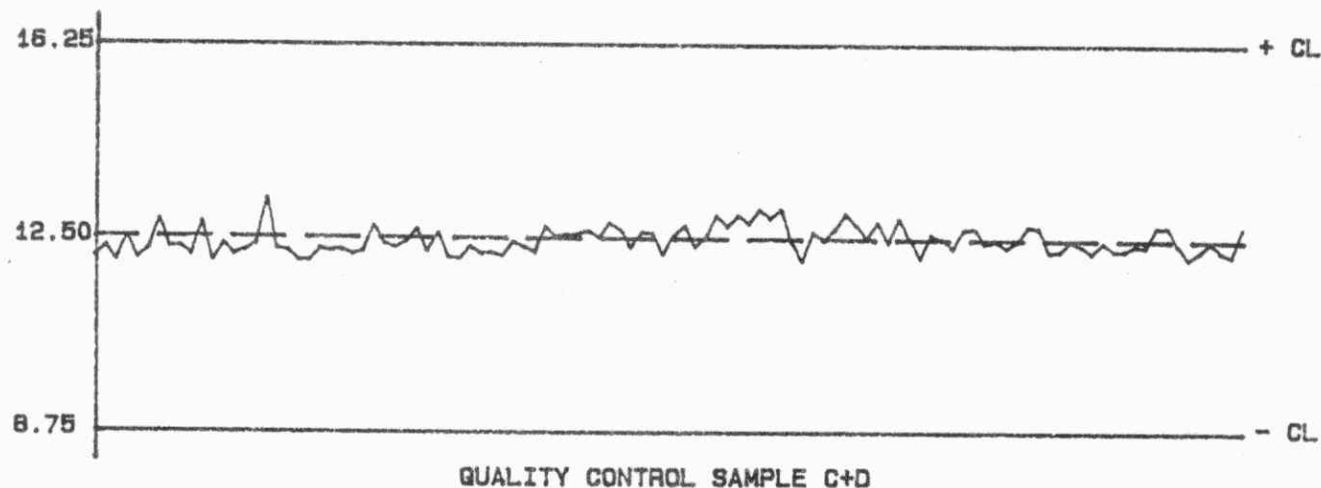
STANDARD DEVIATION (s.dupl): 0.129 W value: 0.1 T value: 0.5

OTHER CHECKS:

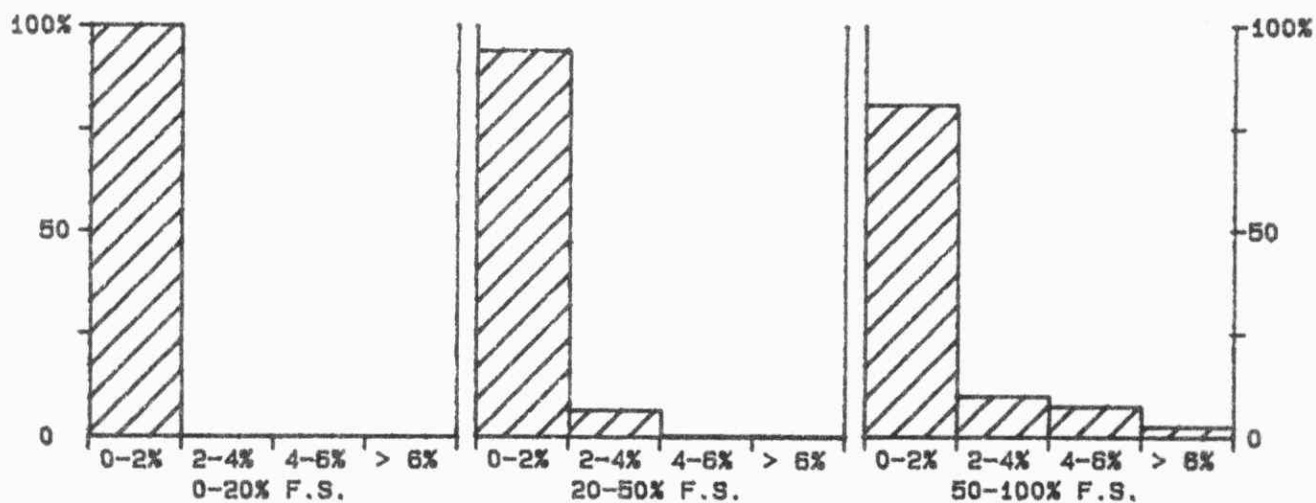
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS ALKALINITY-GRAN (MG/L AS CaCO_3)

FROM: 03/01/86
TO: 24/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS CaCO_3

*** ALKALINITY-TOTAL FIXED ENDPOINT (TFE) ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	01/06/65
LIS Test Name Code:	ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WALK	Unit Code	: 064815
Method Code	: 003CT3	Supervisor	: P. Campbell
Sample Type/Matrix: Domestic Waters, Leachates, Sewage, Industrial Waste, Effluents			

SAMPLING:

Quantity Required: 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples (50.0 mL) are manually pipetted and titrated automatically with 0.02 N sulphuric acid to a pH endpoint of 4.5. Sludges are centrifuged before analysis.

INSTRUMENTATION:

- Automated Fisher Titralyzer II system.

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration: 2 standards, eg, QCA
Drift : 1 standard

MODIFICATIONS:

14/03/86 -THIS TEST WAS AUTOMATED AND ASSIGNED TO THE WATS WORKSTATION.

ALKALINITY-TOTAL FIXED ENDPOINT
QUALITY CONTROL DATA FROM 02/01/86 TO 12/03/86

Lab: Titration

Analytical Range: 1 to 500.0 mg/l as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	285.0	281.5	-3.5	1.37
b :	46	57.0	57.4	0.4	0.57
a+b :	46	342.0	338.9	-3.1	1.79
a-b :	46	228.0	224.2	-3.8	1.10

s.d.(AB): Sw(within run): 0.78 S(between runs): 1.05 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

327.0 to 357.0 for A+B
 218.0 to 238.0 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	0.0 - 50.0	0.24	1.1
29	50.0 - 100.0	1.15	1.3
11	100.0 - 200.0	0.50	0.3
34	200.0 - 500.0	12.48	4.7
89	Overall	7.75	N/A

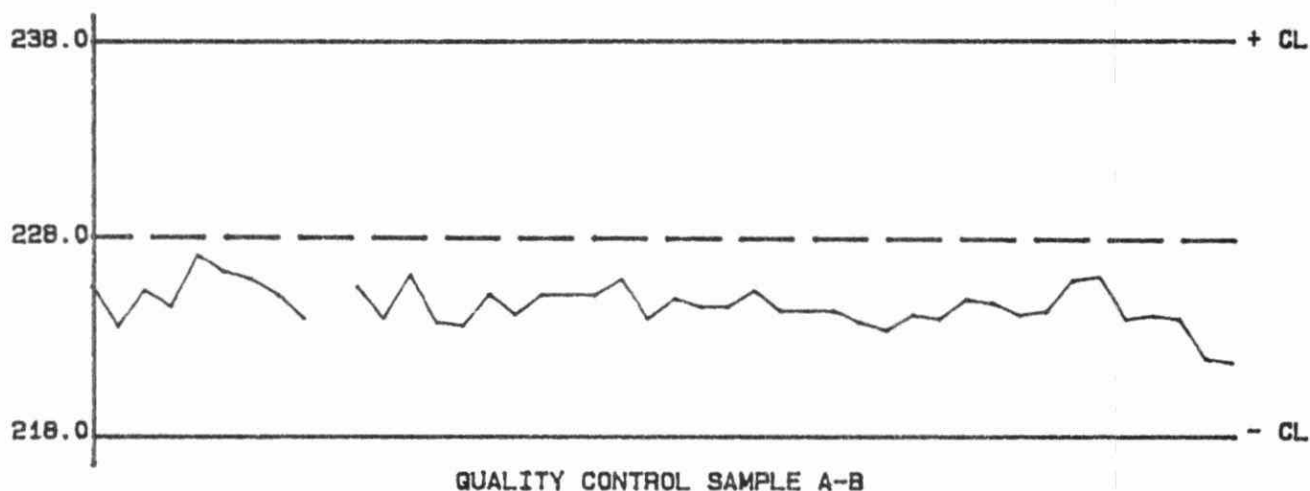
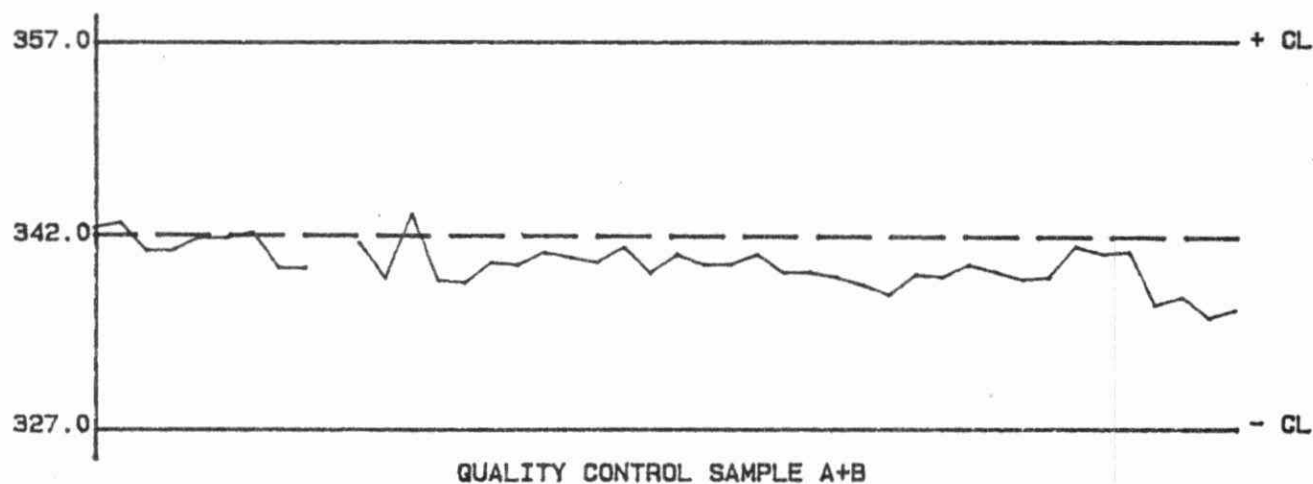
STANDARD DEVIATION (s.dupl): 0.24

W value: 0.2

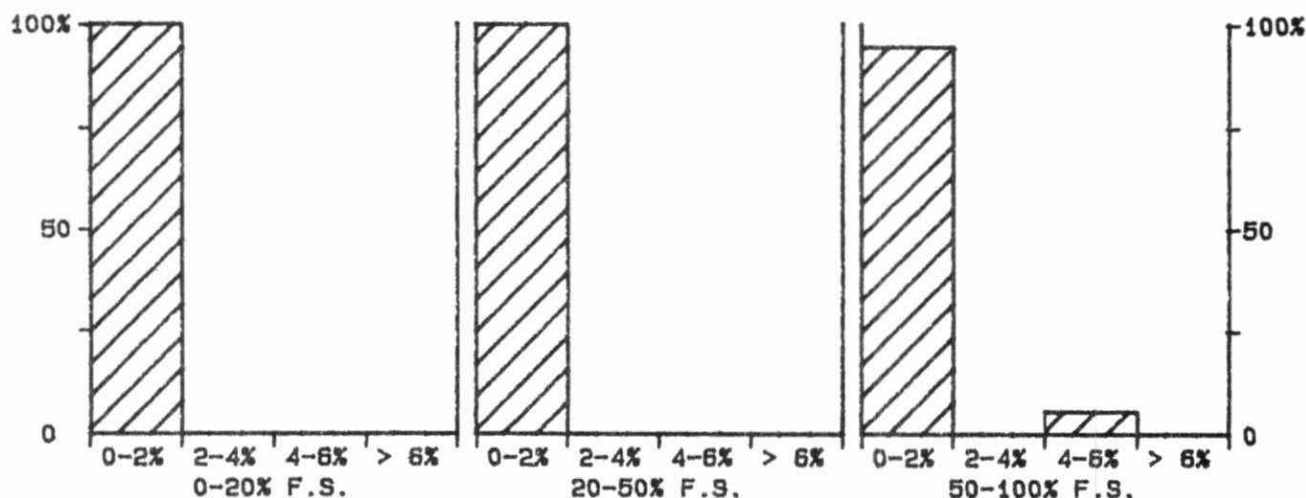
T value: 1

QUALITY CONTROL GRAPHS ALKALINITY-TOTAL FIXED ENDPOINT (MG/L AS CaCO_3)

FROM: 02/01/86
TO: 11/03/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 MG/L AS CaCO_3

*** ALKALINITY - TFE @ PH 4.5 ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	26/07/78
LIS Test Name Code:	ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: DOT	Unit Code	: 064815
Method Code	: 0905T3	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation, Groundwaters			

SAMPLING:

Quantity Required: 150 mL
Container : Amber polyethylene bottle filled to the brim/ screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 0.5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus 2 standards, eg, QCA.
Drift : 2 standard buffers--2 times daily.

TOTAL FIXED 4.5
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 0.5 to 80.00 mg/l as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	240	22.00	21.74	-0.26	0.468
b :	240	6.50	6.55	0.05	0.221
a+b :	240	28.50	28.29	-0.21	0.646
a-b :	240	15.50	15.19	-0.31	0.346

s.d.(AB): Sw(within run): 0.245 S(between runs): 0.366 S/Sw: 1.50

On any given day the calibration is accepted if the values obtained lie within the ranges:

26.25 to 30.75 for A+B
14.00 to 17.00 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	626	0.00 - 10.00	0.110	2.7
	25	10.00 - 20.00	0.143	1.0
	4	20.00 - 40.00	0.168	0.5
	6	40.00 - 80.00	0.118	0.2
	661	Overall	0.112	N/A

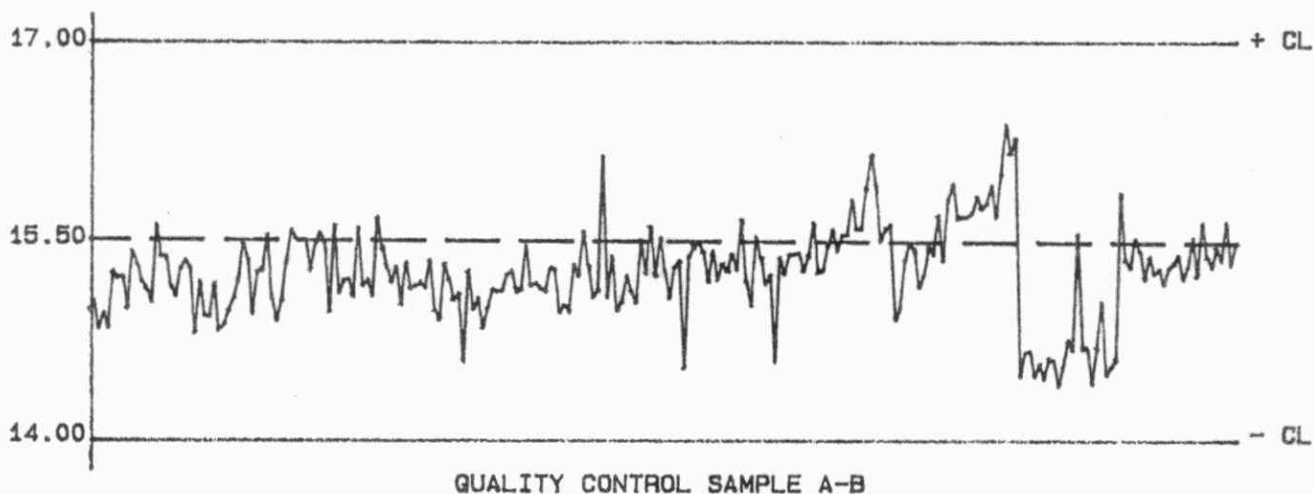
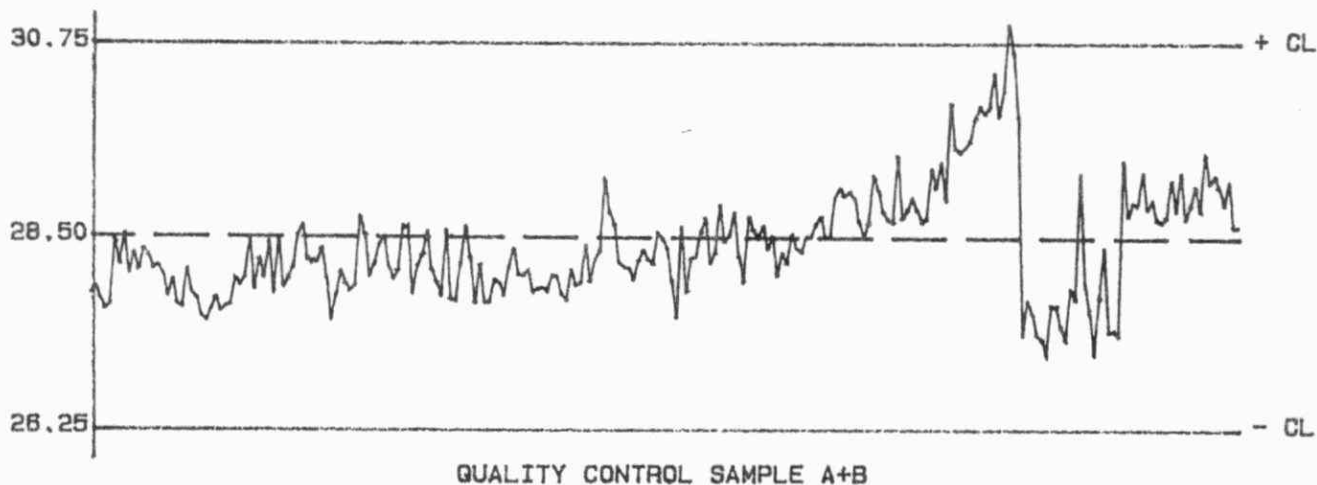
STANDARD DEVIATION (s.dup1): 0.110 W value: 0.1 T value: 0.5

OTHER CHECKS:

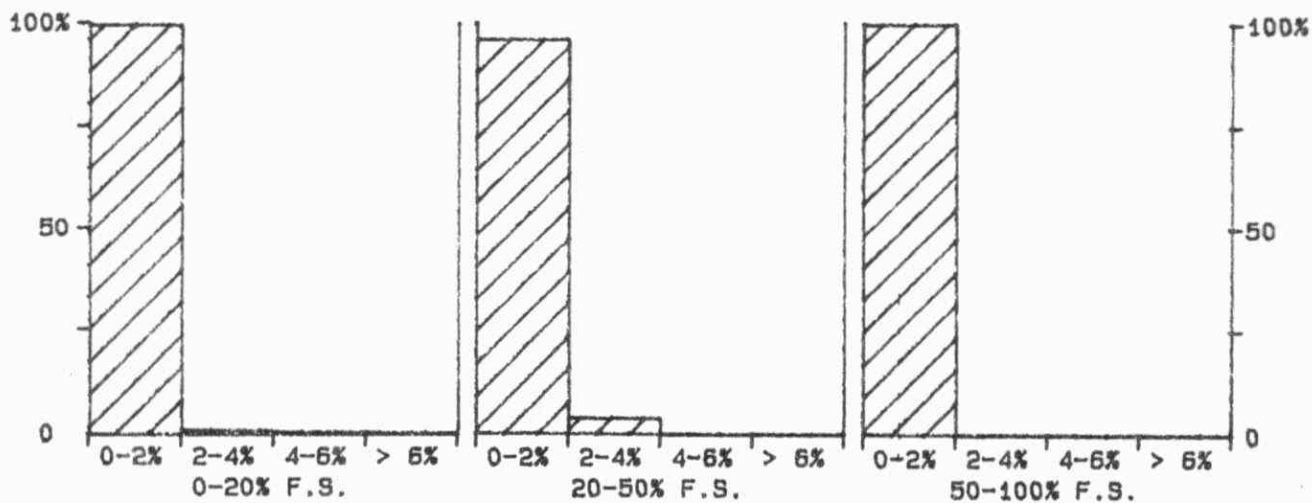
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	232	1.5	0.2

QUALITY CONTROL GRAPHS TOTAL FIXED 4.5 (MG/L AS CaCO₃)

FROM: 03/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 30 MG/L AS CaCO₃

*** ALKALINITY - TOTAL FIXED ENDPOINT (TFE) ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	09/07/80
LIS Test Name Code:	ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: P. Campbell
Sample Type/Matrix: Rivers, Lakes, Precipitation			

SAMPLING:

Quantity Required: 50 mL
Container : Polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.020 N sulphuric acid to a pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. N.B. pH, Gran alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing.

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.2** T value: 1

CALIBRATION:

2 standard buffers covering the pH range 4 to 7.

CONTROLS:

Calibration: LTBL plus 4 standards, eg, QCA.

Drift : In run standards through out the run. Diluted tap water (20% V/V)

MODIFICATIONS:

02/03/84 -QC program was expanded to include pH and total fixed endpoint alkalinity; preparation and storage of QC solutions was modified.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS- River Automated Titration System - designed for the determination of conductivity, pH, alkalinity - total fixed endpoint and alkalinity - Gran. The system is microcomputer controlled with data reduction and direct computer (DCI) capabilities.

ALKALINITY-TOTAL FIXED ENDPOINT
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Titration

Analytical Range: 1 to 250 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	120	250.0	249.9	-0.1	2.02
b :	120	50.0	49.5	-0.5	0.96
a+b :	120	300.0	299.4	-0.6	2.46
a-b :	120	200.0	200.5	0.5	1.89
c :	120	10.00	9.80	-0.20	0.156
d :	120	2.50	2.42	-0.08	0.112
c+d :	120	12.50	12.22	-0.28	0.223
c-d :	120	7.50	7.38	-0.12	0.156

s.d.(AB): Sw(within run): 1.41 S(between runs): 1.58 S/Sw: 1.12
s.d.(CD): Sw(within run): 0.110 S(between runs): 0.136 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

288.8 to 311.2 for A+B
192.5 to 207.5 for A-B
8.75 to 16.25 for C+D
5.00 to 10.00 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	21	0.00 - 5.00	0.155	4.4
	26	5.00 - 10.00	0.176	2.5
	31	10.00 - 25.00	0.372	2.2
	83	25.0 - 100.0	0.83	1.2
	115	100 - 250	1.3	0.8
	276	Overall	0.9	N/A

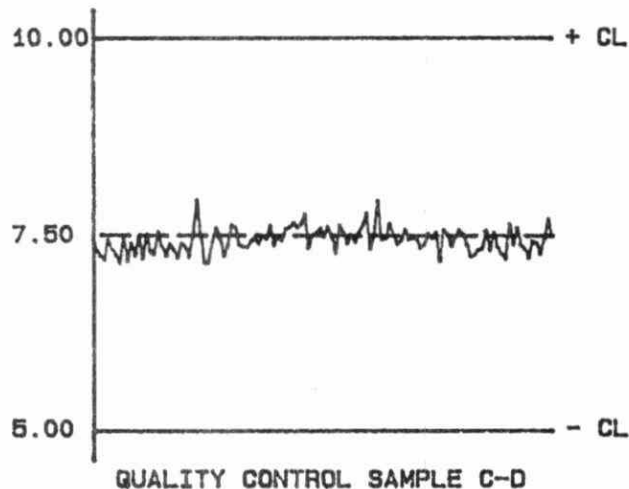
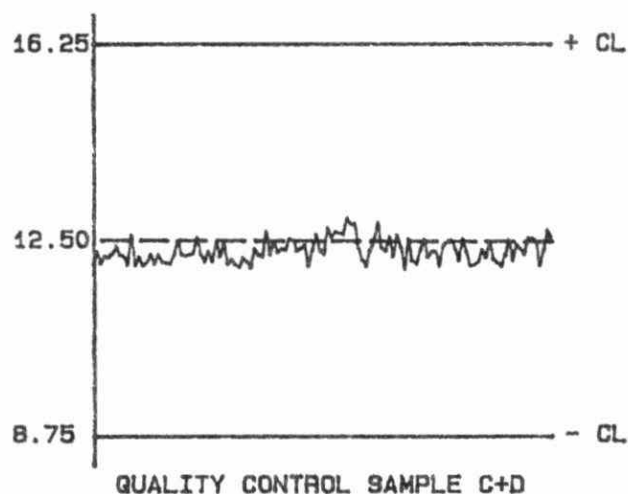
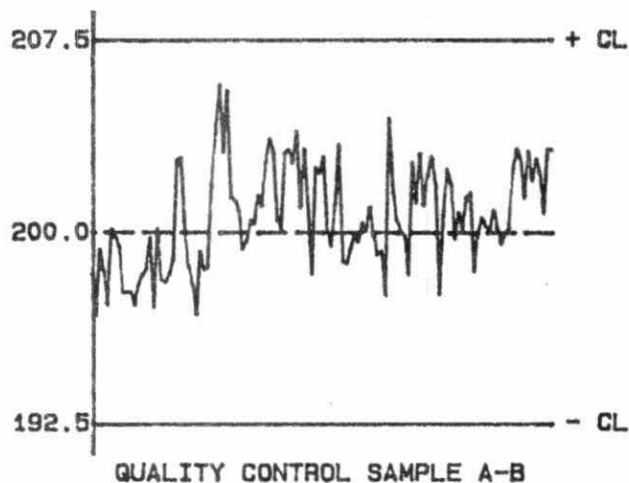
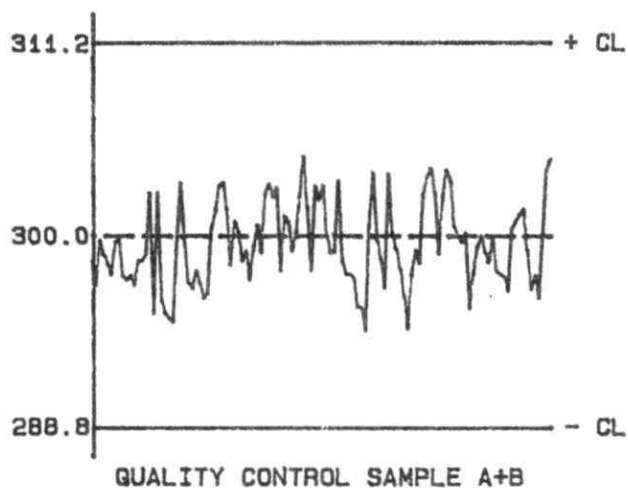
STANDARD DEVIATION (s.dup1): 0.155 W value: 0.2 T value: 1

OTHER CHECKS:

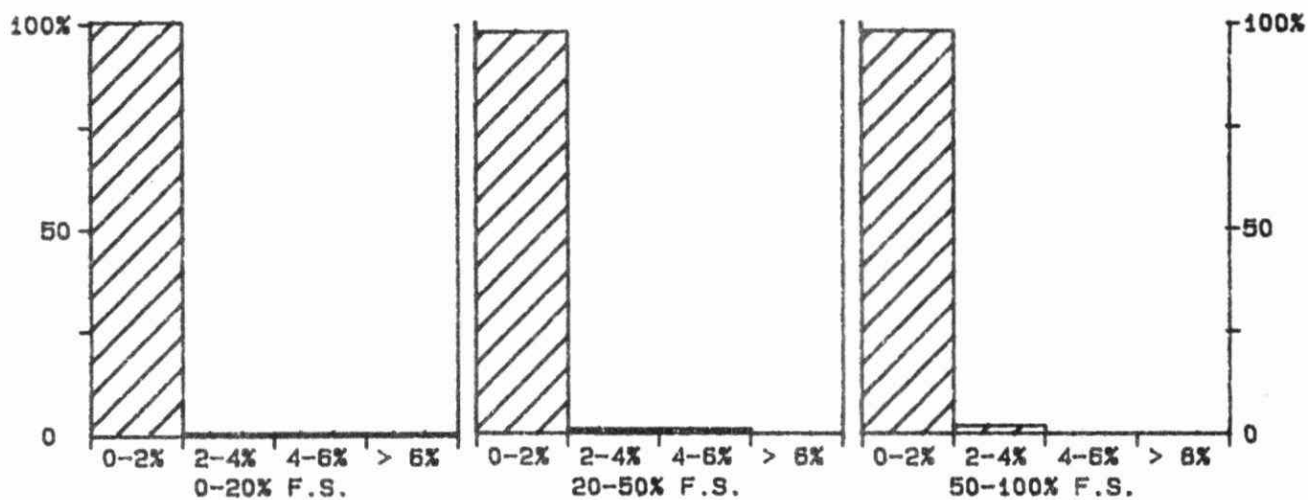
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS ALKALINITY-TFE (MG/L AS CaCO_3)

FROM: 03/01/86
TO: 31/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 250 MG/L AS CaCO_3

*** ALKALINITY - TOTAL FIXED ENDPOINT (TFE) ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	09/07/80
LIS Test Name Code:	ALKT	Units	: mg/L as CaCO ₃
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: P. Campbell
Sample Type/Matrix: Domestic Waters, Sewage, Effluents			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic.

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.020 N sulphuric acid to a pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. N.B. pH, Gran alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing.

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.2# T value: 1

CALIBRATION:

2 standard buffers covering the pH range 4 to 7.

CONTROLS:

Calibration: LTBL plus 3 standards, eg, QCA.
Drift : In run standards through out the run. Diluted tap water (50% V/V)

MODIFICATIONS:

04/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

ALKALINITY-TOTAL FIXED ENDPOINT
QUALITY CONTROL DATA FROM 14/03/86 TO 23/12/86

Lab: Titration

Analytical Range: 1 to 250.0 mg/L as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	100	250.0	251.1	1.1	1.68
b :	100	100.0	100.5	0.5	1.17
a+b :	100	350.0	351.6	1.6	2.34
a-b :	100	150.0	150.6	0.6	1.68
c :	100	100.00	100.15	0.15	0.967
d :	100	25.00	25.16	0.16	1.198
c+d :	100	125.00	125.31	0.31	1.629
c-d :	100	75.00	74.99	-0.01	1.445

s.d.(AB): SW(within run): 1.20 S(between runs): 1.45 S/SW: 1.21
s.d.(CD): SW(within run): 1.022 S(between runs): 1.089 S/SW: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

341.0 to 359.0 for A+B
144.0 to 156.0 for A-B
110.00 to 140.00 for C+D
65.00 to 85.00 for C-D

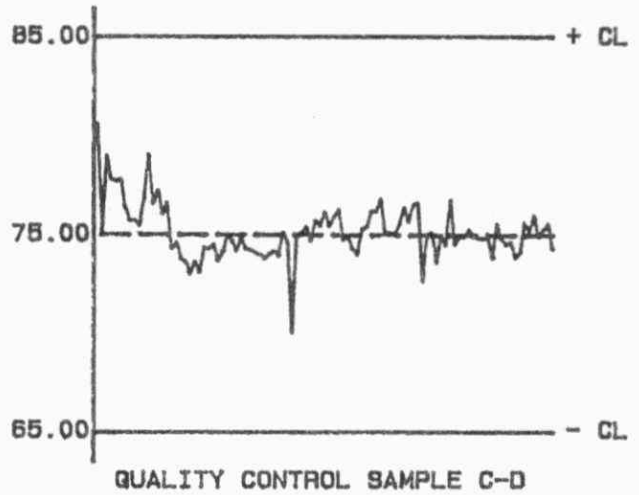
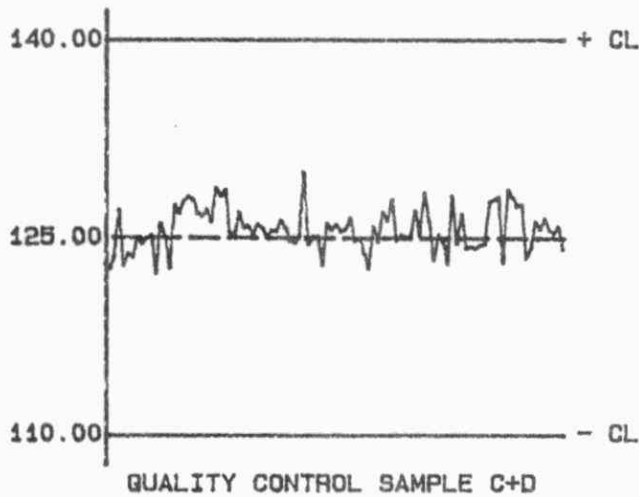
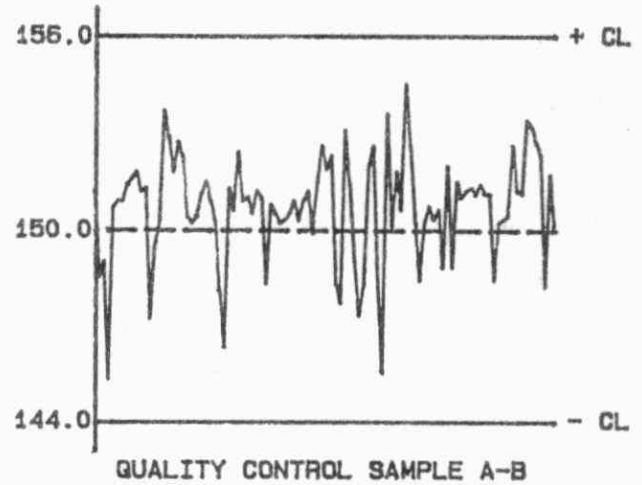
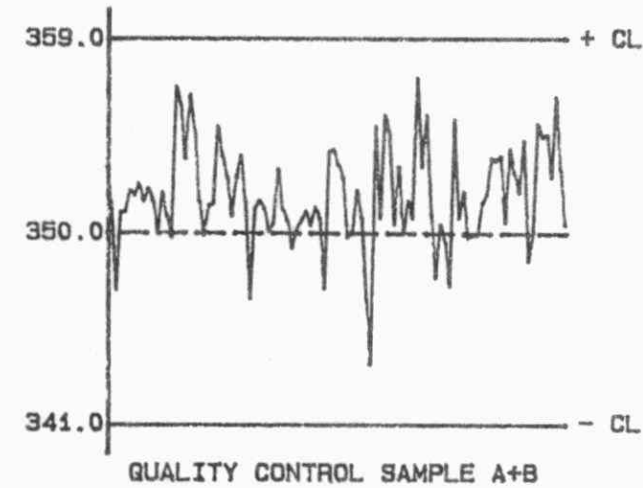
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var. (%)
	3	0.00 - 5.00	0.117	3.9
	3	5.00 - 10.00	0.358	4.2
	7	10.00 - 25.00	0.271	1.4
	84	25.00 - 100.00	0.459	0.6
	79	100.0 - 250.0	0.94	0.5
	176	Overall	0.71	N/A

STANDARD DEVIATION (s.dupl): 0.238 W value: 0.2 T value: 1

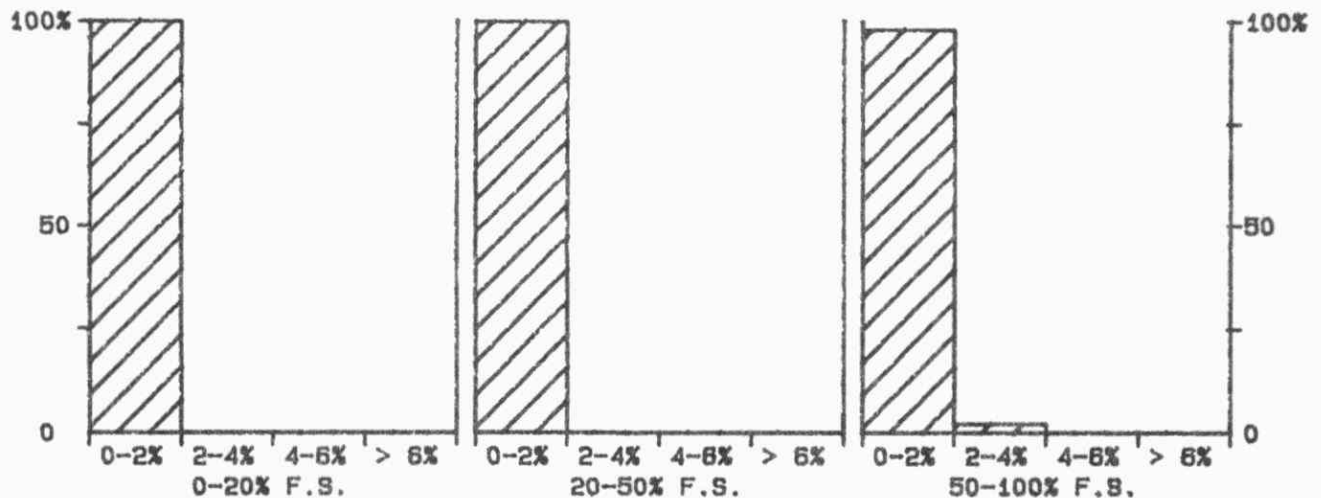
OTHER CHECKS:	Number of Data	Data Mean	Standard (1) Deviation
Long Term Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS ALKALINITY-TFE (MG/L AS CaCO₃)

FROM: 14/03/86
TO: 23/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CaCO₃

*** ALKALINITY - TFE @ PH 3.8 ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	21/10/85
LIS Test Name Code:	ALKT3	Units	: mg/L as CaCO3
Work Station Code	: DOT	Unit Code	: 064815
Method Code	: 0905T3	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation, Groundwaters			

SAMPLING:

Quantity Required: 150 mL
Container : Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 3.8. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus 2 standards, eg, QCA.
Drift : 2 standard buffers--2 times daily.

TOTAL FIXED 3.8
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 1 to 100.00 mg/l as CaCO₃

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	235	29.00	28.60	-0.40	0.758
b :	235	14.00	13.15	-0.85	0.625
a+b :	234	43.00	41.74	-1.26	1.284
a-b :	234	15.00	15.46	0.46	0.492

s.d.(AB): Sw(within run): 0.348 S(between runs): 0.695 S/Sw: 2.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

39.93 to 46.07 for A+B
12.95 to 17.05 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	652	0.00 - 20.00	0.340	3.0
	14	20.00 - 40.00	2.407	10.4
	7	40.00 - 60.00	0.209	0.4
	2	60.00 - 100.00	0.222	0.3
	675	Overall	0.482	N/A

STANDARD DEVIATION (s.dupl): 0.340

W value: 0.2

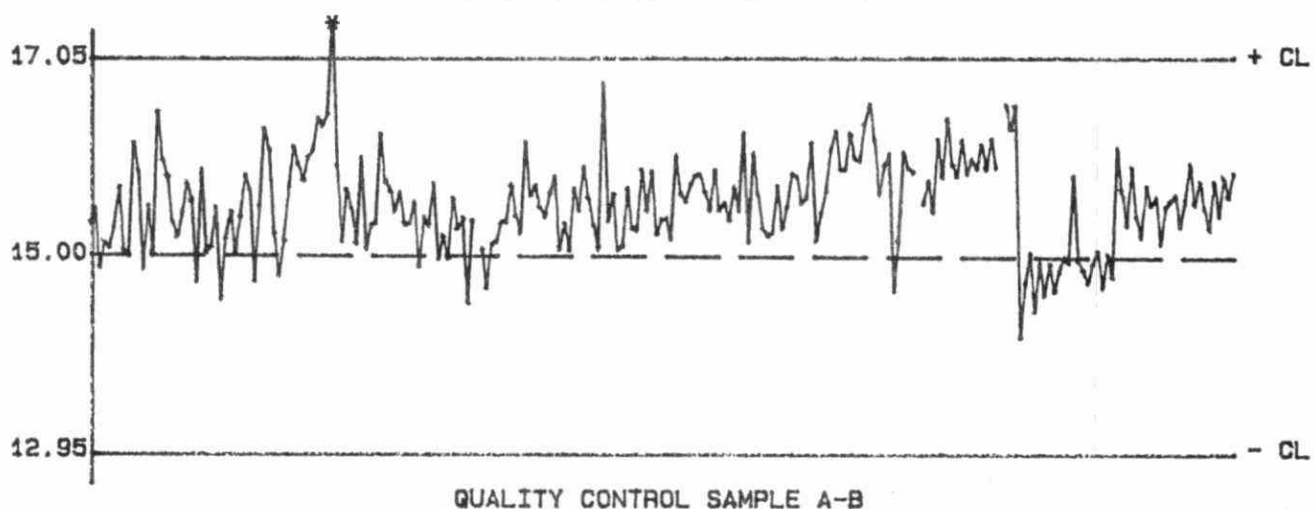
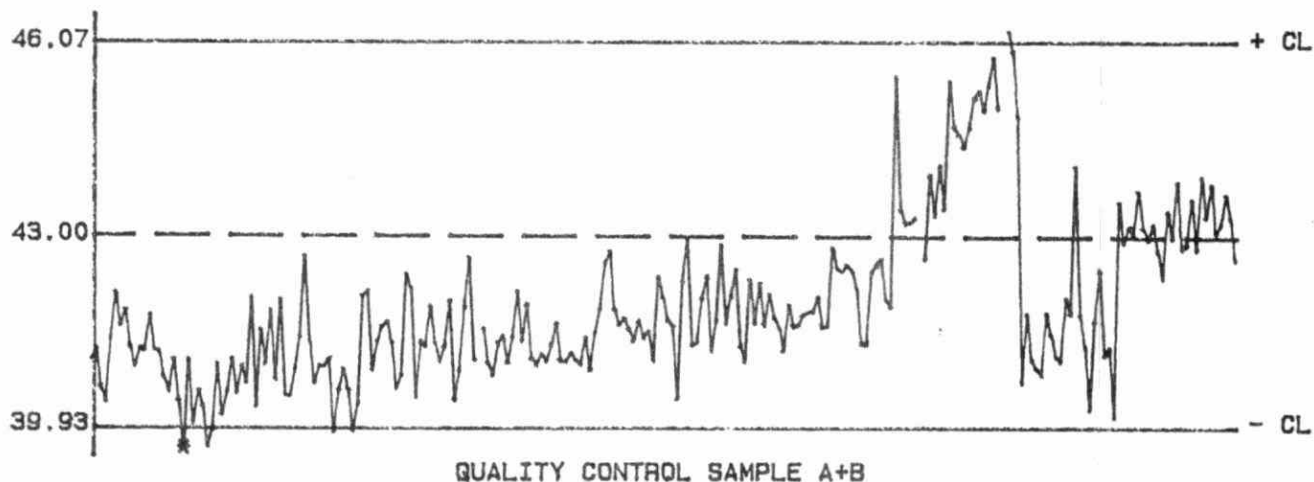
T value: 1

OTHER CHECKS:

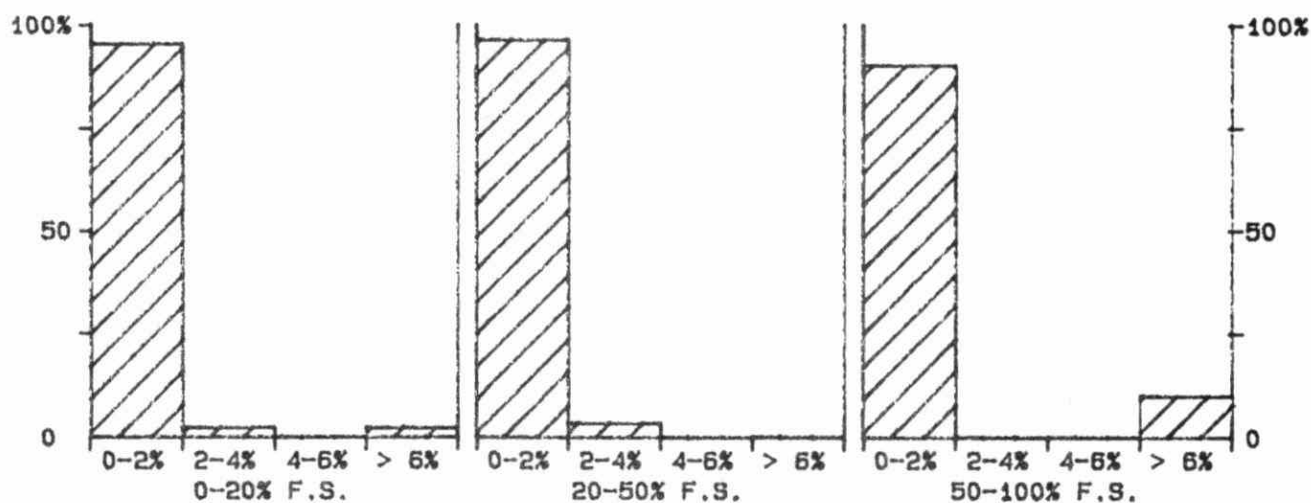
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	228	7.94	0.633

QUALITY CONTROL GRAPHS TOTAL FIXED 3.8 (MG/L AS CAC03)

FROM: 03/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** ALUMINUM - SOIL (Xca) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	ALECA	Units	: ug/g as Al (dried)
Work Station Code	: DOSOLAL	Unit Code	: 073813
Method Code	: 314AA5	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 20 g (dry < 2 mm)
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

A 10 g sample plus 20 mL 0.01 N calcium chloride is agitated for 5 minutes, centrifuged and filtered. The filtration is analyzed for Al by AAS at 309.3 nm using an NO₂-acetylene flame.
Approximate absorbance: 0.1 at the full scale level.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Two soil samples representing different soil types
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Values for recoveries are unknown-average value used.

ALUMINUM - SOIL (Xca)
QUALITY CONTROL DATA FROM 24/09/86 TO 30/12/86

Lab: Dorset Soils

Analytical Range: 2.5 to 40.0 ug/g as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	30.0	N/A	N/A	N/A
b :	0	10.0	N/A	N/A	N/A
a+b :	0	40.0	N/A	N/A	N/A
a-b :	0	20.0	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

34.0 to 46.0 for A+B
16.0 to 24.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	10	16.2	16.2	0.95
r2 :	10	0.4	0.4	0.26

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
18	0.0 - 10.0	0.54	15.7
12	10.0 - 20.0	0.77	5.3
8	20.0 - 40.0	1.81	6.1
38	Overall	1.00	N/A

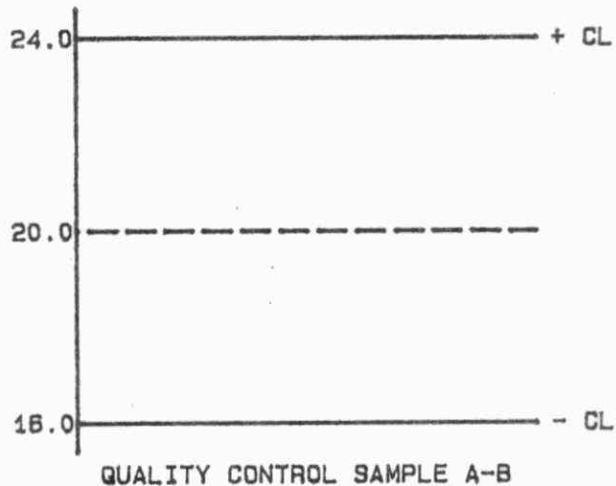
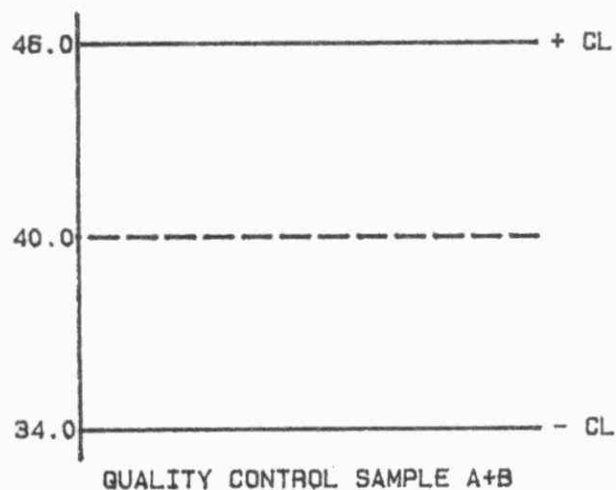
STANDARD DEVIATION (s.dupl): 0.54 W value: 0.5 T value: 2.5

OTHER CHECKS:

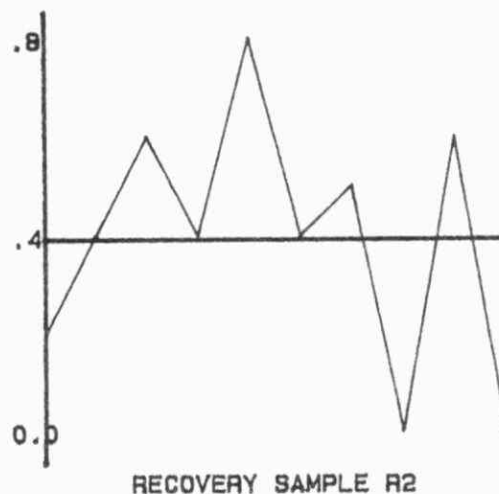
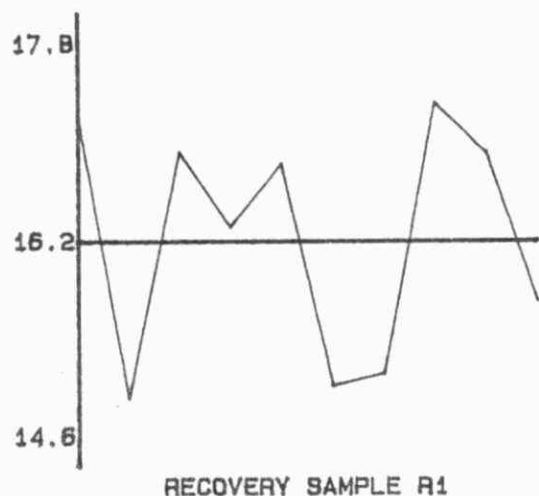
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	10	0.1	0.21

QUALITY CONTROL GRAPHS ALUMINUM - SOIL (XCA) (UG/G AS AL)

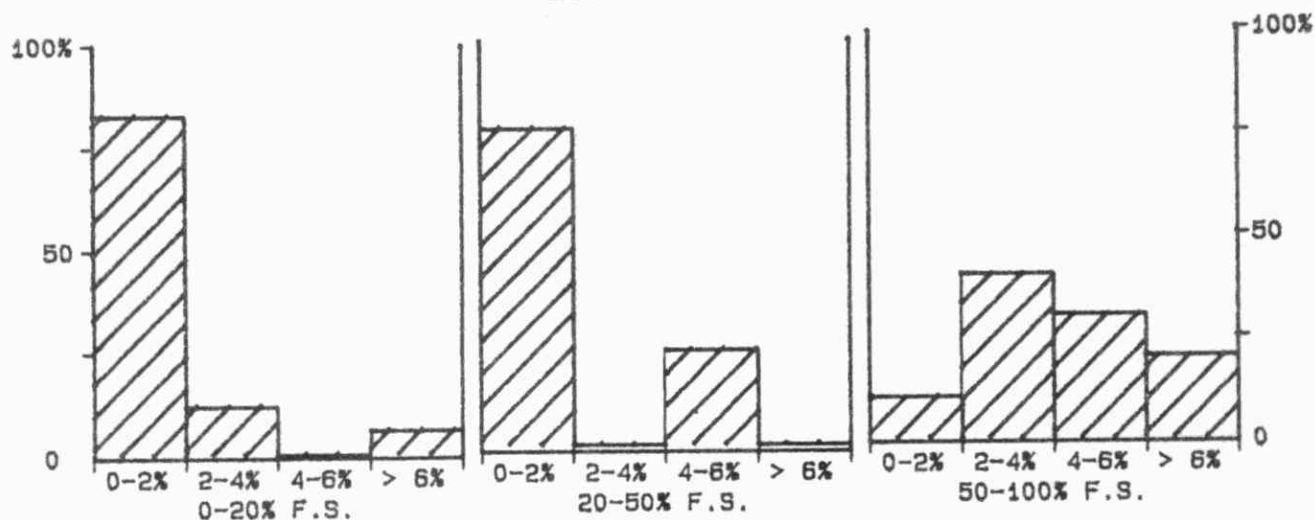
FROM: 24/09/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 UG/G AS AL

*** ALUMINUM - CV REACT ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	24/10/85
LIS Test Name Code:	ALEXCV,ALNDCV	Units	: ug/L as CV react Al
Work Station Code	: DOMISC	Unit Code	: 063813
Method Code	: 0928C2	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, and Groundwaters.			

SAMPLING:

Quantity Required: 8 ml.
Container : Polystyrene tube, capped

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as ug/L as CV reactive organic Al.

INSTRUMENTATION:

Auto-analyse sampler system with colourimeter and chart printer.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2 T value: 10

CALIBRATION:

B1 plus 10 standards daily

CONTROLS:

Calibration: LTB plus 4 standards, eg, QCA

ALUMINUM - CV REACT
QUALITY CONTROL DATA FROM 14/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 10 to 1000 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	61	750	744	-6	12.7
b :	61	250	245	-5	9.5
a+b :	61	1000	988	-12	20.3
a-b :	61	500	499	-1	9.5
c :	61	75	74	-1	2.2
d :	61	25	23	-2	2.3
c+d :	61	100	97	-3	3.4
c-d :	61	50	51	1	3.0

s.d.(AB): Sw(within run): 6.7 S(between runs): 11.2 S/Sw: 1.67
s.d.(CD): Sw(within run): 2.1 S(between runs): 2.3 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

925 to 1075 for A+B
450 to 550 for A-B
85 to 115 for C+D
40 to 60 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	55	0 - 50	3.8	15.1
	27	50 - 100	8.1	11.0
	46	100 - 250	26.8	15.3
	22	250 - 500	13.7	4.2
	5	500 - 1000	13.7	2.0
	155	Overall	16.2	N/A

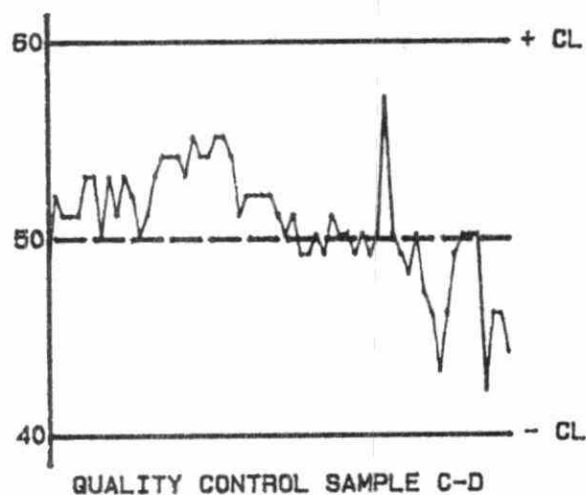
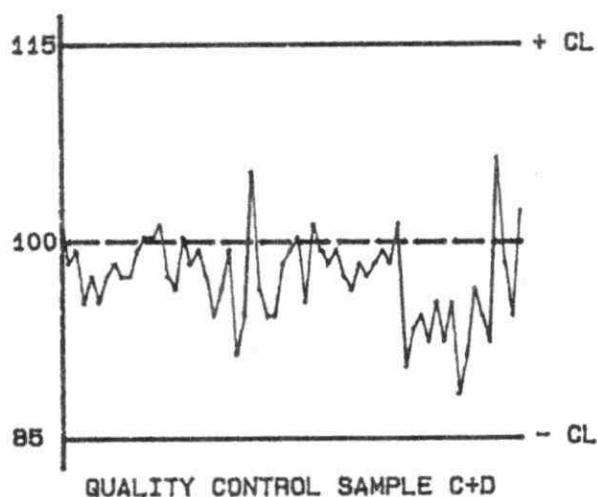
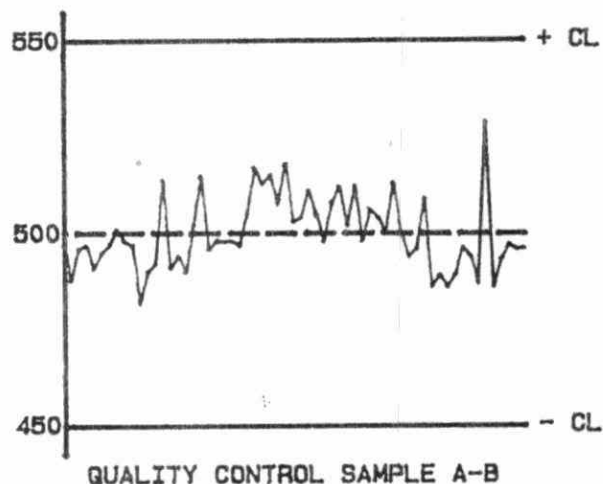
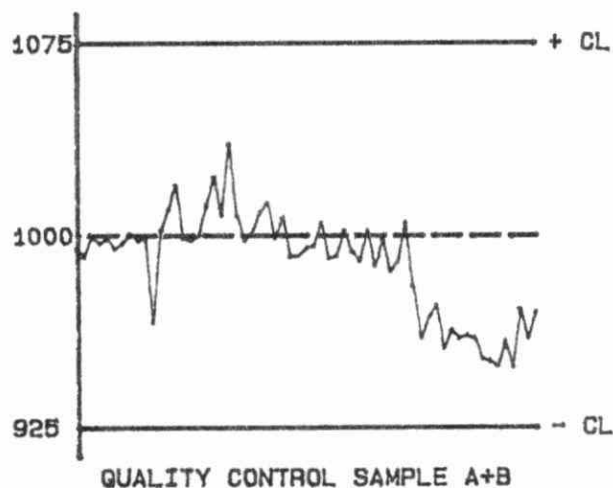
STANDARD DEVIATION (s.dupl): 3.8 W value: 2 T value: 10

OTHER CHECKS:

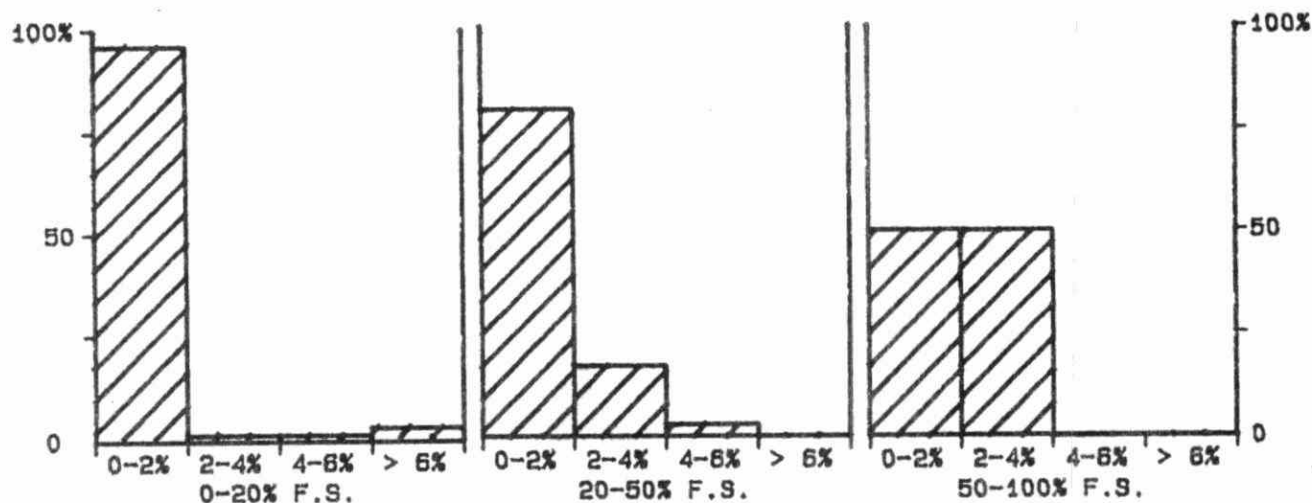
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	61	166	5.5
Long Term Blank :	61	0	0.6

QUALITY CONTROL GRAPHS ALUMINUM - CV REACT (UG/L AS AL)

FROM: 14/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 UG/L AS AL

*** ALUMINUM - SOIL (Xdi) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	ALEDI	Units	: % by weight AL
Work Station Code	: DOMETDI	Unit Code	: 070813
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 0.5 g (dry <150 um).
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80 C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 50 mL with deionized water. The final solution is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.
Approximate absorbance: 0.3 at the full scale level.
Iron is determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaces Perkin Elmer 403

NOTES:

Values for recoveries are unknown--average value used.

ALUMINIUM - SOIL (Xd1)
QUALITY CONTROL DATA FROM 14/11/86 TO 31/12/86

Lab: Dorset Soils

Analytical Range: 0.05 to 1.00 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.75	N/A	N/A	N/A
b :	0	0.25	N/A	N/A	N/A
a+b :	0	1.00	N/A	N/A	N/A
a-b :	0	0.50	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.82 to 1.07 for A+B
0.45 to 0.55 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	11	1.05	1.02	0.050
r2 :	11	0.18	0.18	0.018
r3 :	11	0.16	0.16	0.020

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
22	0.00 - 0.20	0.012	10.8
8	0.20 - 0.50	0.013	3.2
13	0.50 - 1.00	0.026	3.7
43	Overall	0.017	N/A

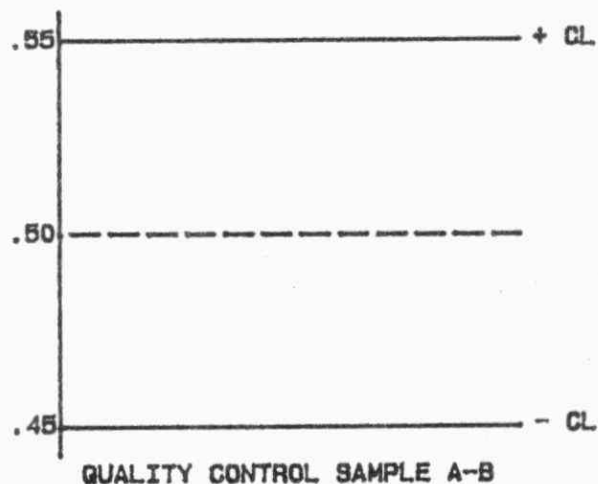
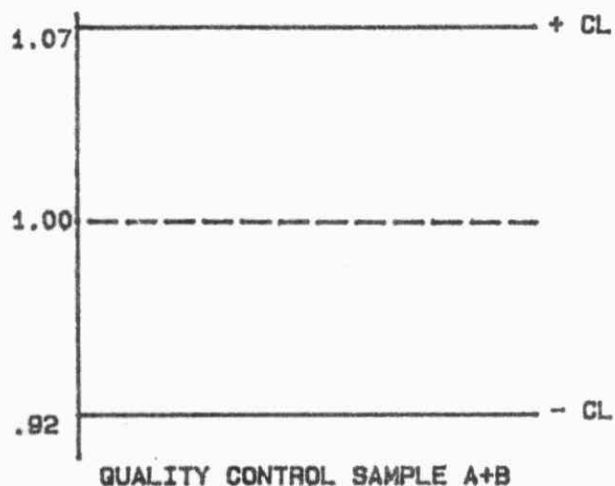
STANDARD DEVIATION (s.dupl): 0.012 W value: 0.01 T value: 0.05

OTHER CHECKS:

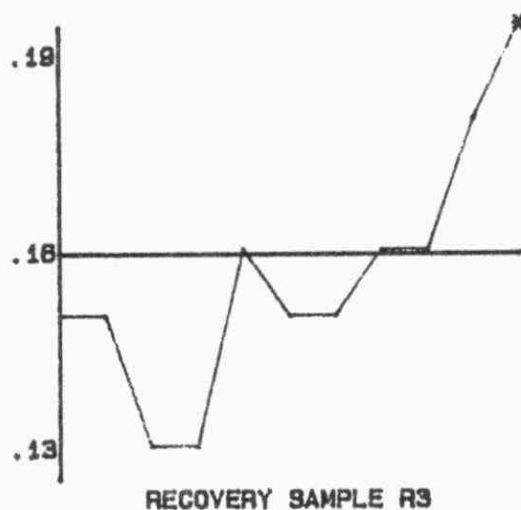
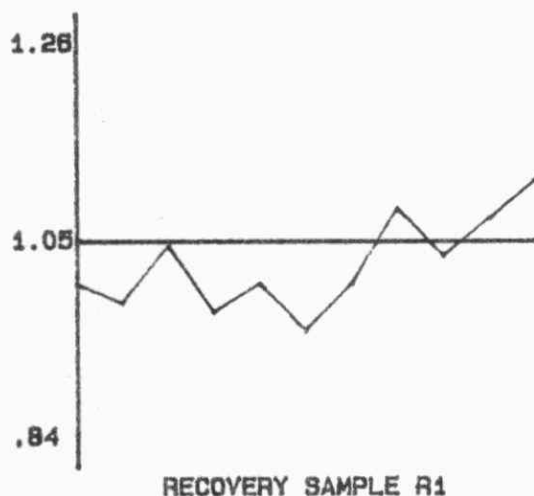
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	11	0.00	0.000

QUALITY CONTROL GRAPHS ALUMINIUM - SOIL (XDI) (% AS AL)

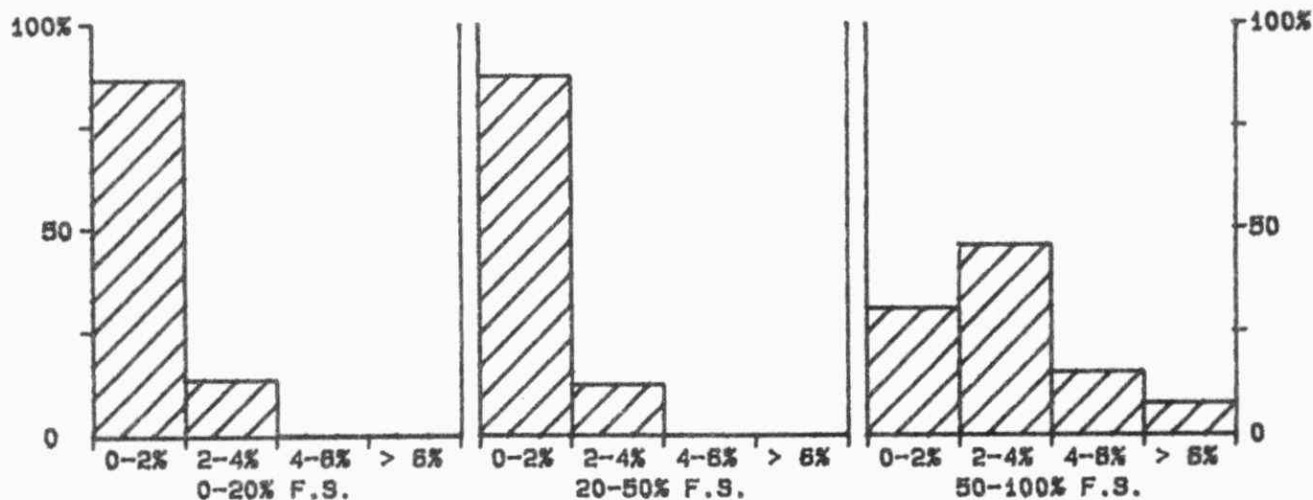
FROM: 14/11/88
TO: 31/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** ALUMINUM - SOIL (Xpy) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	ALEPY	Units	: % by weight Al
Work Station Code	: DOMETALX	Unit Code	: 070813
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 0.6 g (dry <150 um)
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to < 150 um.

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 10 minutes and the supernatant is analyzed by AAS at 309.3 nm with a NO₂-acetylene flame.

Approximate absorbance: 0.3 at the full scale value.
Iron and manganese may be determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaces Perkin Elmer 403

NOTES:

Values for recoveries are unknown--average value used.

ALUMINUM - SOIL (Xpy)
QUALITY CONTROL DATA FROM 11/09/86 TO 12/12/86

Lab: Dorset Soils

Analytical Range: 0.05 to 0.50 % as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.38	N/A	N/A	N/A
b :	0	0.13	N/A	N/A	N/A
a+b :	0	0.50	N/A	N/A	N/A
a-b :	0	0.25	N/A	N/A	N/A

s.d.(AB): SW(within run): N/A S(between runs): N/A S/SW: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.46 to 0.54 for A+B
0.23 to 0.27 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	9	0.90	0.93	0.108
r2 :	9	0.15	0.15	0.010
r3 :	9	0.16	0.15	0.024

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
9	0.00 - 0.10	0.010	18.0
15	0.10 - 0.25	0.009	5.6
10	0.25 - 0.50	0.023	6.6
34	Overall	0.015	N/A

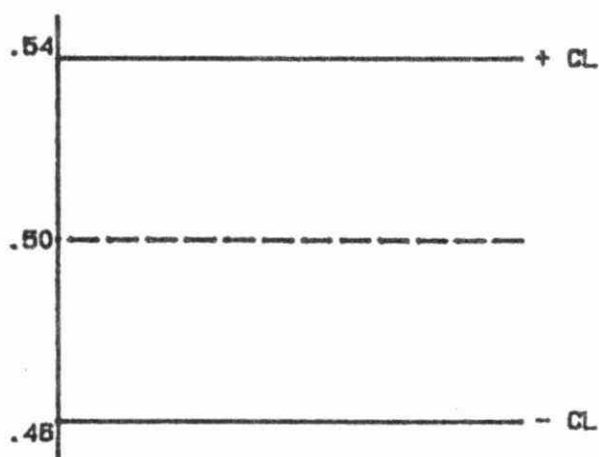
STANDARD DEVIATION (s.dupl): 0.010 W value: 0.01 T value: 0.05

OTHER CHECKS:

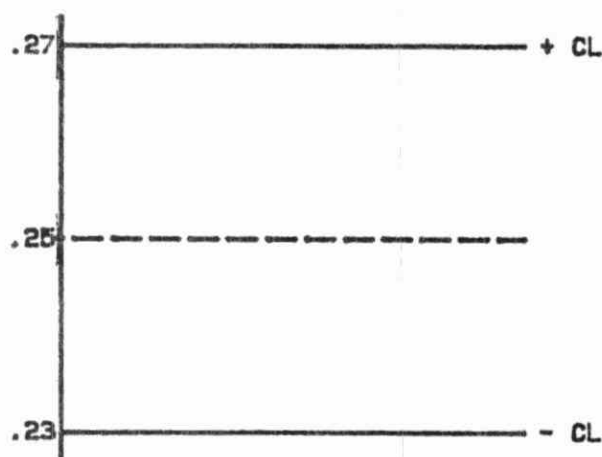
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	9	0.00	0.000

QUALITY CONTROL GRAPHS ALUMINUM - SOIL (XPY) (% AS AL)

FROM: 11/09/86
TO: 12/12/86

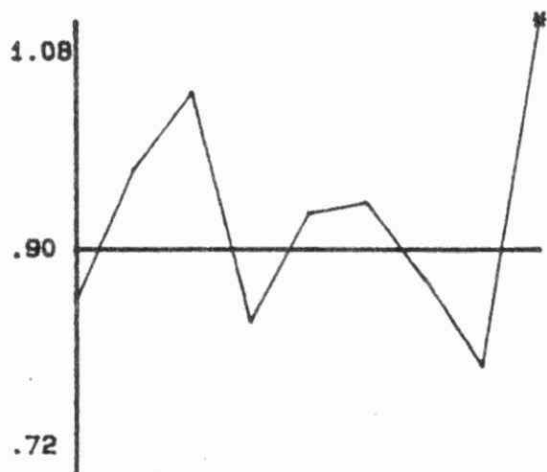


QUALITY CONTROL SAMPLE A+B

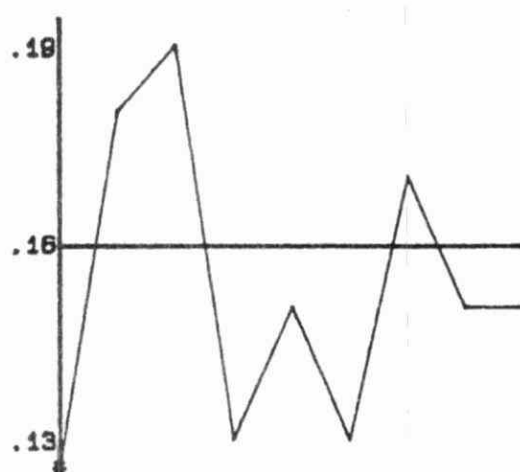


QUALITY CONTROL SAMPLE A-B

— EXPECTED VALUE
- - - CONTROL LIMIT (CL)

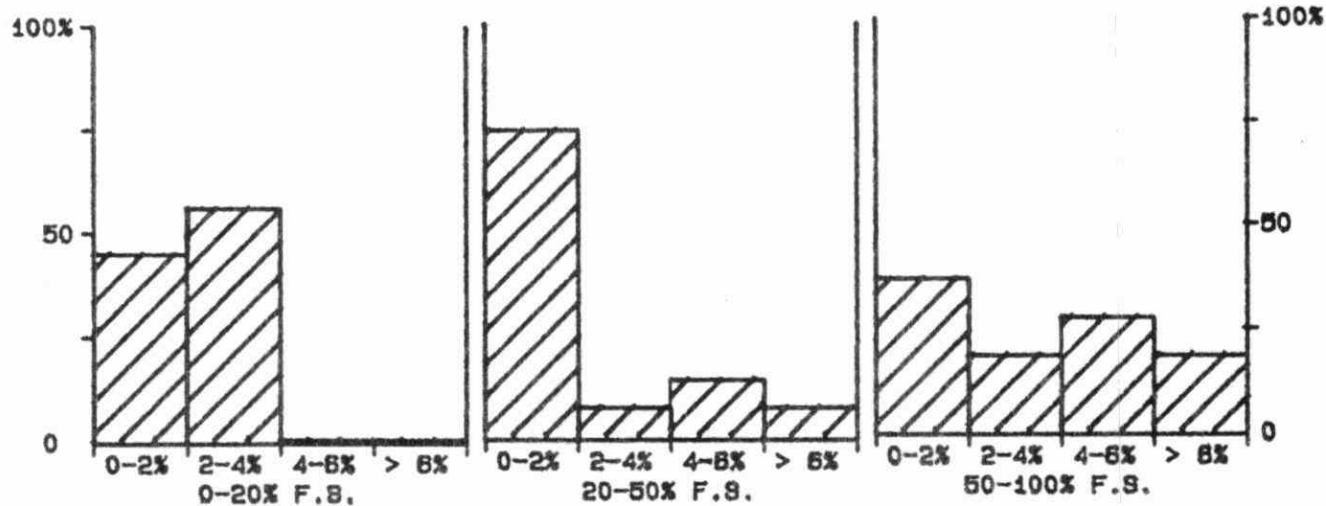


RECOVERY SAMPLE R1



RECOVERY SAMPLE R3

* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .5 % AS AL

*** ALUMINUM - SOIL (Xsc) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	ALESC	Units	: meq/100g Al
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 6 g (dry <2 mm)
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm)

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Al by AAS at 309.3 with an NO₂-acetylene flame. Approximate absorbance: 0.2 at the full scale value. Calcium, magnesium, and potassium are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -3g sample used for all soil types (6g previously used for sandy soils)
01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown--average value used.

ALUMINUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 01/10/86 TO 30/12/86

Lab: Dorset Soils

Analytical Range: 0.1 to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	1.88	N/A	N/A	N/A
b :	0	0.63	N/A	N/A	N/A
a+b :	0	2.50	N/A	N/A	N/A
a-b :	0	1.25	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.68 for A+B
1.13 to 1.37 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	14	1.52	1.52	0.114
r2 :	14	0.02	0.01	0.013
r3 :	14	0.02	0.01	0.018

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
20	0.00 - 0.50	0.032	22.4
19	0.50 - 1.25	0.061	7.2
13	1.25 - 2.50	0.126	6.7
52	Overall	0.076	N/A

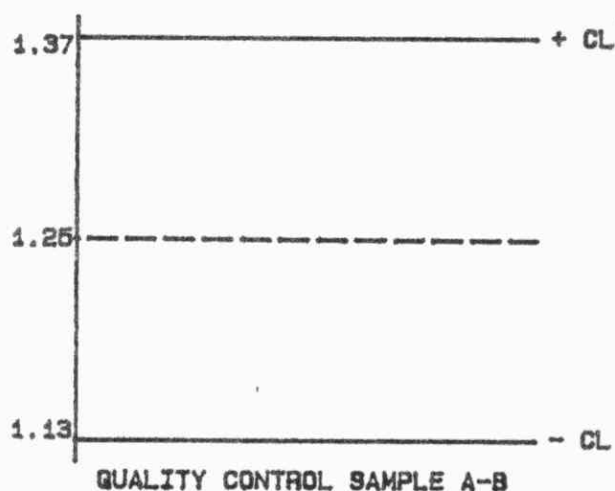
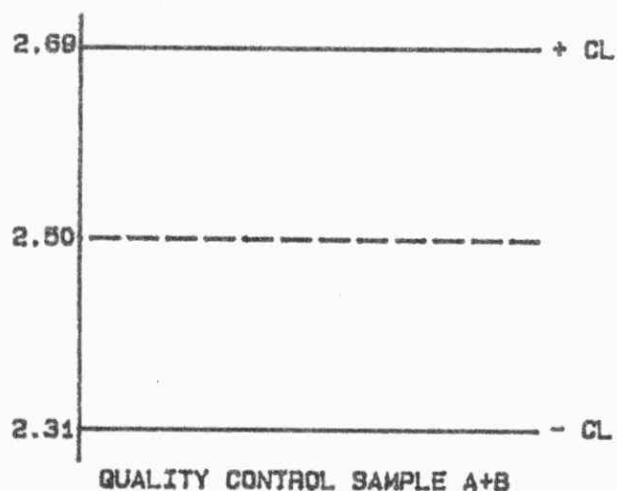
STANDARD DEVIATION (s.dupl): 0.032 W value: 0.02 T value: 0.1

OTHER CHECKS:

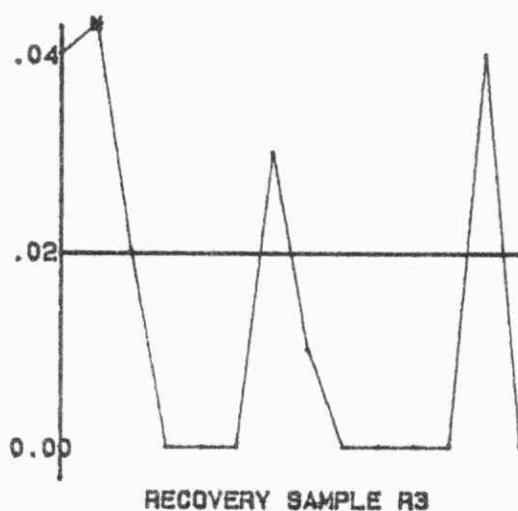
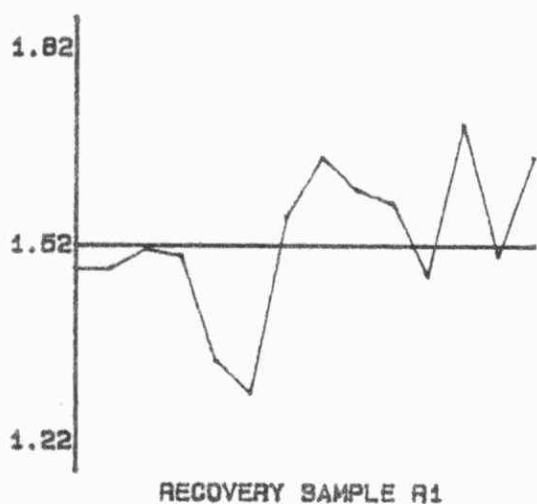
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	14	0.01	0.018

QUALITY CONTROL GRAPHS ALUMINUM - SOIL (XSC) (MEQ/100G)

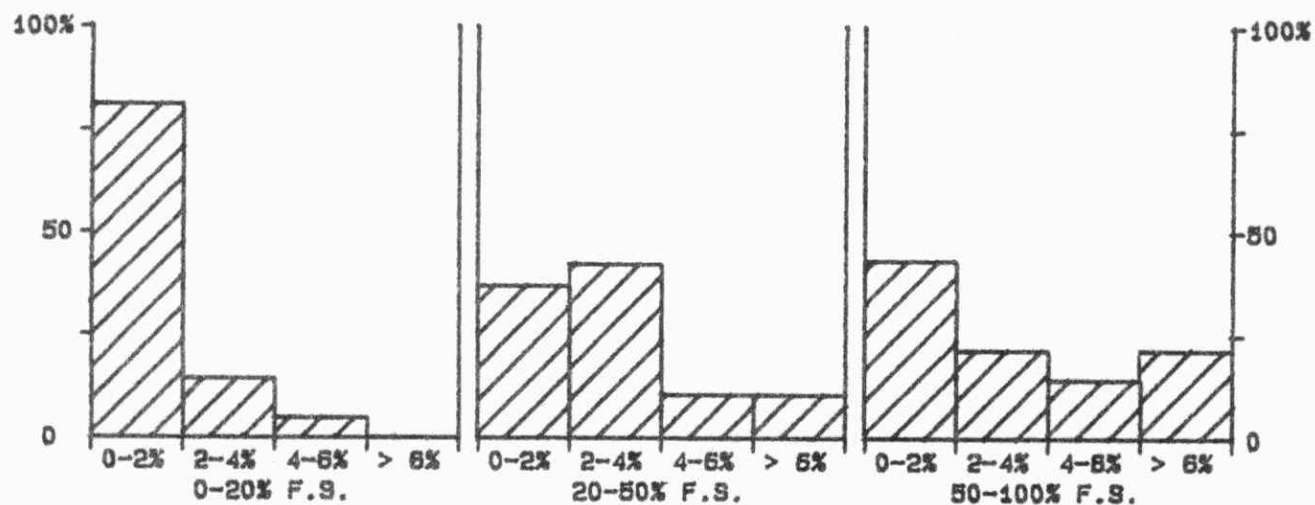
FROM: 01/10/88
TO: 30/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** ALUMINUM - TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	06/09/83
LIS Test Name Code:	ALUT	Units	: ug/L as Al
Work Station Code	: DOAAS	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation, Biota and Groundwaters.			

SAMPLING:

Quantity Required: 1 mL
Container : 500 mL 'spice jar'/Nalgene bottle, acidified to 0.1%

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 308.3 nm.
Approximate absorbance: .5 at the full scale level.

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

B1 plus 5 standards daily

CONTROLS:

Calibration: LTB plus 4 standards, eg, QCA

TOTAL ALUMINUM
QUALITY CONTROL DATA FROM 14/02/86 TO 21/08/86

Lab: Dorset

Analytical Range: 5 to 200 ug/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	62	35	36	1	2.9
d :	58	7	8	1	0.9
c+d :	58	42	44	2	3.3
c-d :	58	28	28	0	2.9

s.d.(CD): Sw(within run): 2.1 S(between runs): 2.1 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

27 to 57 for C+D
 13 to 38 for C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0 - 5	1.0	34.1
14	5 - 10	1.5	17.9
26	10 - 25	2.6	13.8
84	25 - 100	4.3	7.1
75	100 - 200	7.4	5.1
211	Overall	5.3	N/A

STANDARD DEVIATION (s.dupl): 1.0

W value: 1

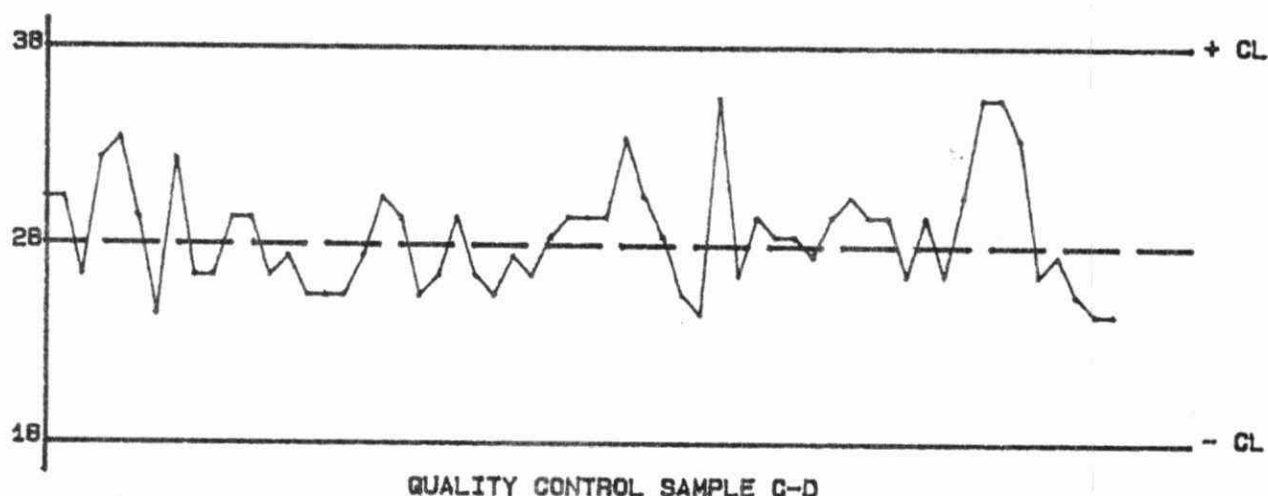
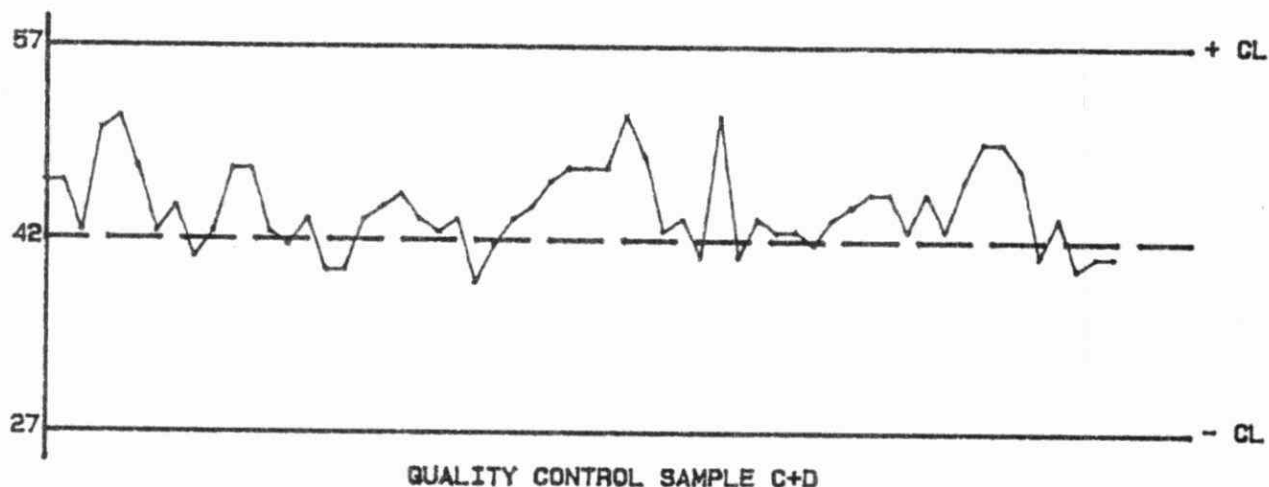
T value: 5

OTHER CHECKS:

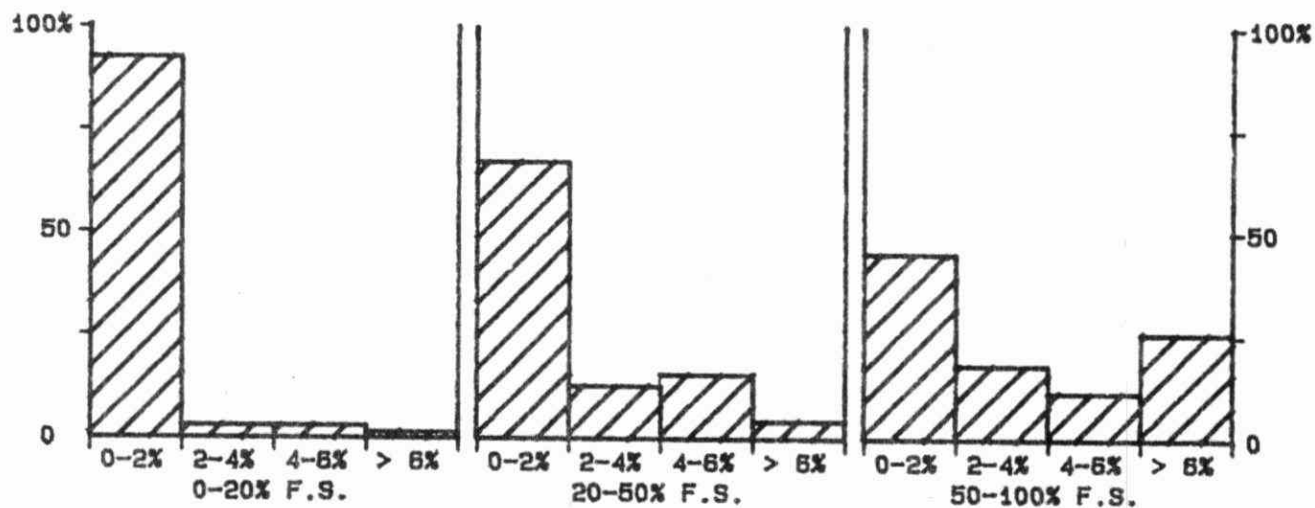
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	0	N/A	N/A
Long Term Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS TOTAL ALUMINUM (UG/L AS AL)

FROM: 14/02/86
TO: 21/08/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 UG/L AS AL

*** CADMIUM - TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	26/11/84
LIS Test Name Code:	CDUT	Units	: ug/L as Cd
Work Station Code	: DOAAS	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation, and Biota			

SAMPLING:

Quantity Required: 1 mL
Container : 500 mL 'spice jar'/Nalgene bottles, acidified to 0.1%

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: .400 at the full scale level.

INSTRUMENTATION:

Automated GFAAS/sampler system with microcomputer data processing software.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

B1 plus 4 standards daily

CONTROLS:

Calibration: LTB plus 4 standards, eg, QCA

TOTAL CADMIUM (AAS)
QUALITY CONTROL DATA FROM 09/03/86 TO 31/12/86

Lab: Dorset

Analytical Range: 0.05 to 2.000 ug/l as Cd

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	31	1.600	1.662	0.062	0.1575
b :	31	0.600	0.499	-0.101	0.1039
a+b :	31	2.200	2.161	-0.039	0.2007
a-b :	31	1.000	1.163	0.163	0.1759
c :	31	0.160	0.214	0.054	0.0527
d :	31	0.060	0.056	-0.004	0.0248
c+d :	31	0.220	0.270	0.050	0.0686
c-d :	31	0.100	0.157	0.057	0.0457

s.d.(AB): Sw(within run): 0.1244 S(between runs): 0.1334 S/Sw: 1.07
s.d.(CD): Sw(within run): 0.0323 S(between runs): 0.0412 S/Sw: 1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.800 to 2.500 for A+B
0.800 to 1.200 for A-B
0.032 to 0.408 for C+D
-0.025 to 0.225 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	55	0.000 - 0.250	0.0178	20.4
	8	0.250 - 0.500	0.1230	33.0
	8	0.500 - 1.000	0.1169	14.5
	13	1.000 - 1.500	0.2251	18.8
	5	1.500 - 2.000	0.2086	12.8
	89	Overall	0.1124	N/A

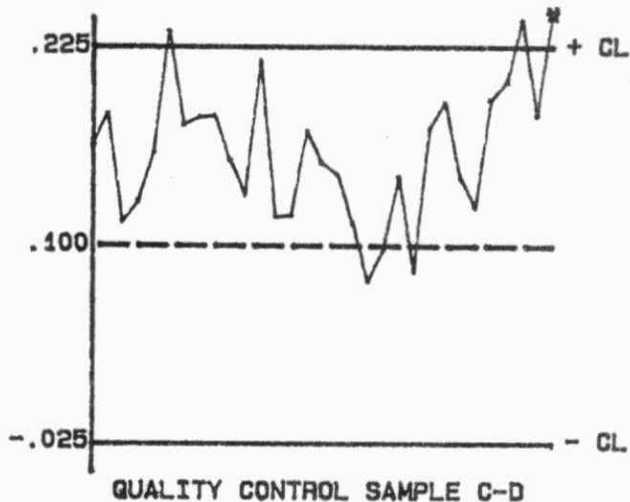
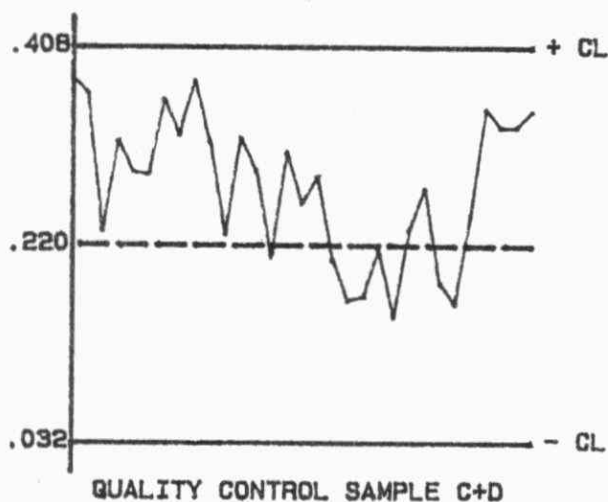
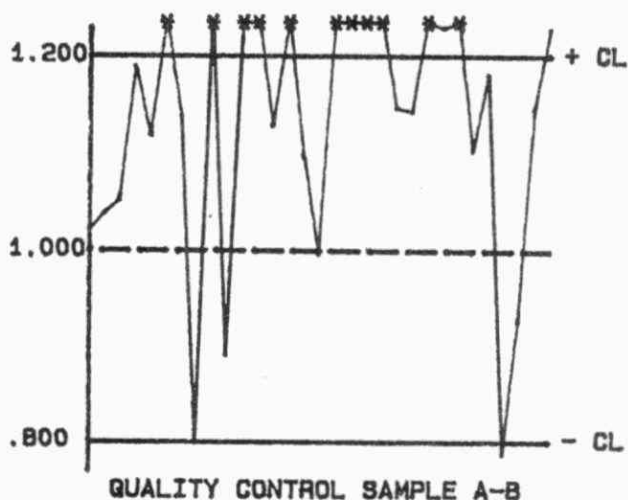
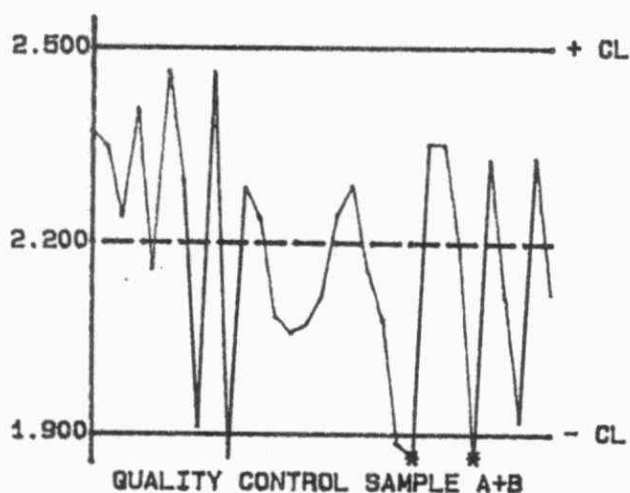
STANDARD DEVIATION (s.dupl): 0.0178 W value: 0.01 T value: 0.05

OTHER CHECKS:

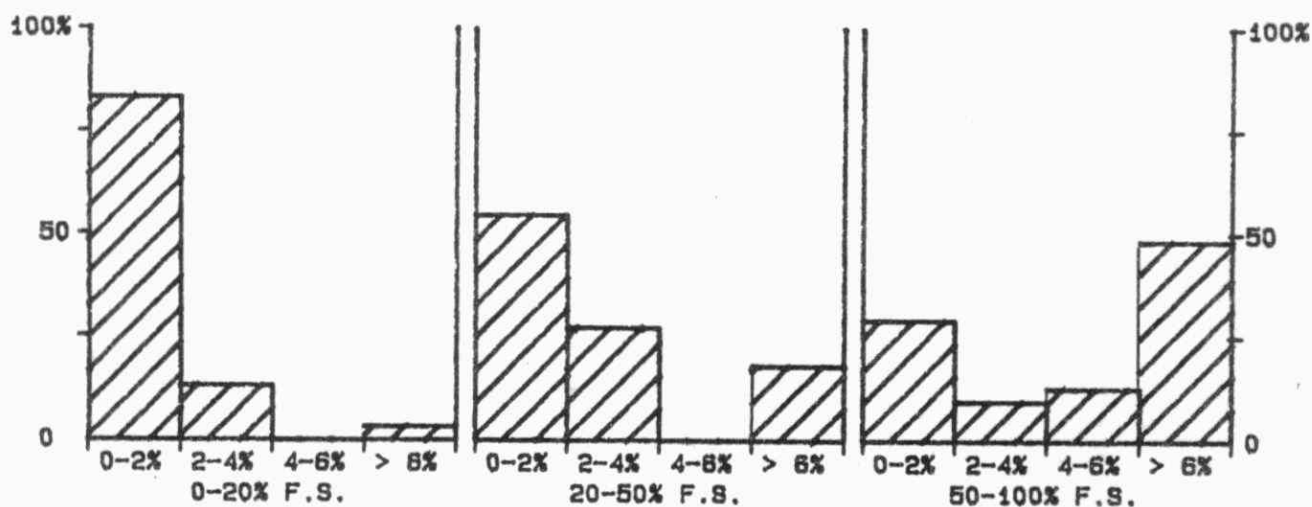
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	0	N/A	N/A
Long Term Blank :	31	0.013	0.0177

QUALITY CONTROL GRAPHS TOTAL CADMIUM (AAS) (UG/L AS CD)

FROM: 09/03/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 UG/L AS CD

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	18/05/78
LIS Test Name Code:	CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow			

SAMPLING:

Quantity Required: 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Samples are analysed by AAS at 422.7 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

CALCIUM
QUALITY CONTROL DATA FROM 06/01/86 TO 22/12/86

Lab: Atomic Absorption

Analytical Range: 0.1 to 2.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	85	1.20	1.22	0.02	0.030
b :	84	0.20	0.23	0.03	0.020
a+b :	84	1.40	1.45	0.05	0.033
a-b :	84	1.00	1.00	-0.00	0.033

s.d.(AB): SW(within run): 0.023 S(between runs): 0.025 S/SW: 1.09

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.31 to 1.49 for A+B
0.94 to 1.06 for A-B

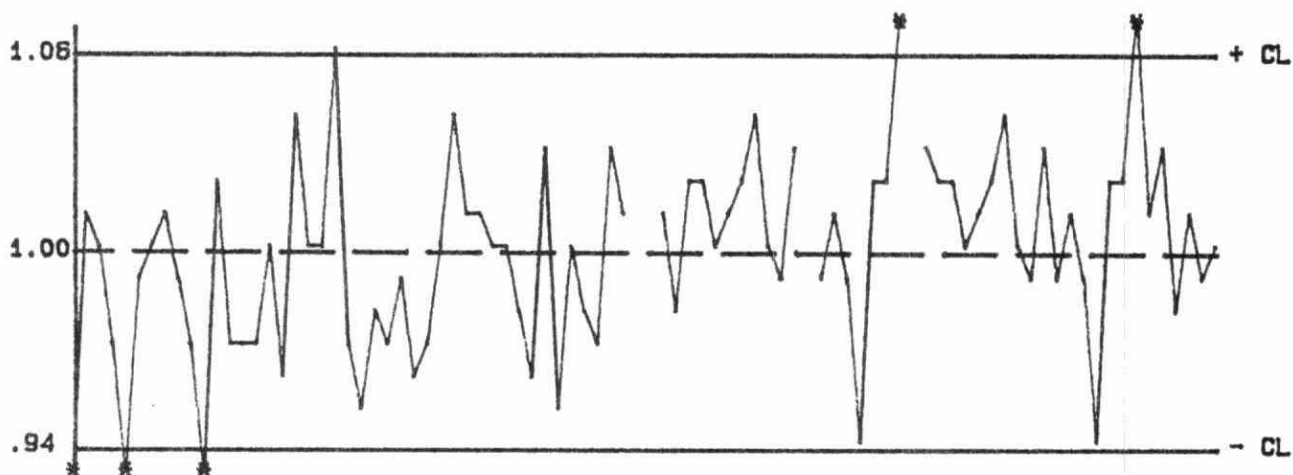
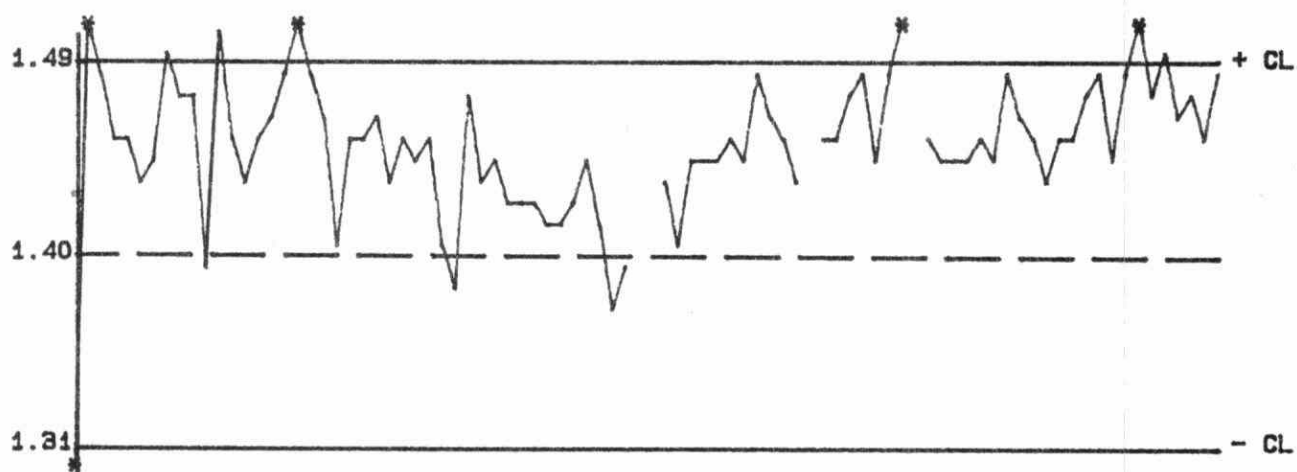
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
102	0.00 - 0.20	0.028	32.1
69	0.20 - 0.50	0.084	25.4
37	0.50 - 1.00	0.052	7.4
14	1.00 - 2.00	0.071	4.9
222	Overall	0.058	N/A

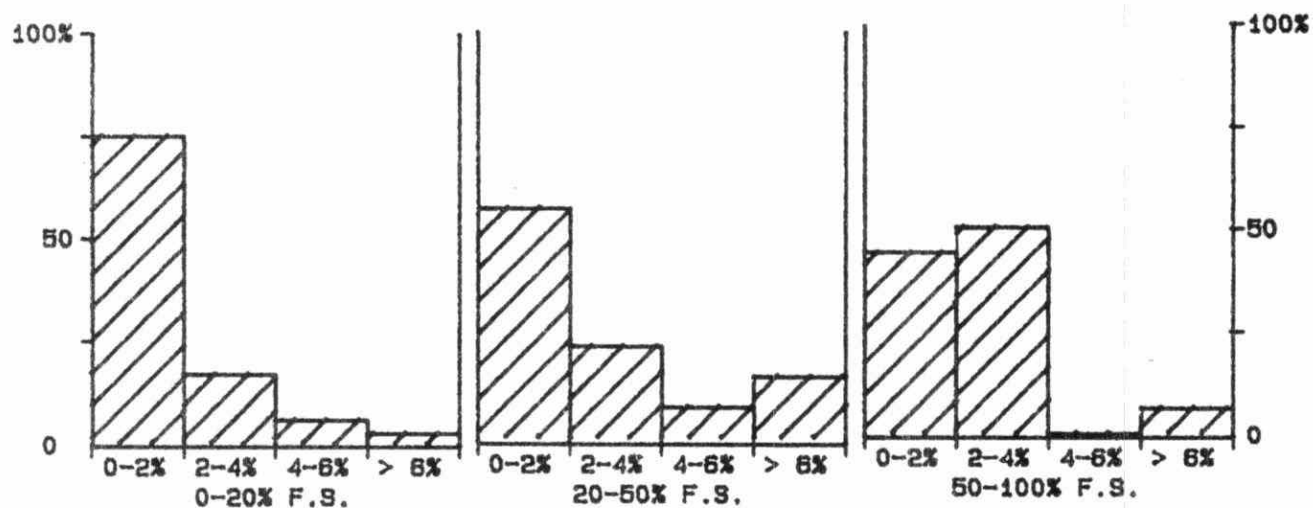
STANDARD DEVIATION (s.dupl): 0.028 W value: 0.02 T value: 0.1

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 06/01/86
TO: 22/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS CA

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	01/04/74
LIS Test Name Code:	CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: F. Tomassini
Sample Type/Matrix:	Rivers, Lakes, Soil Extracts, Effluents.		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 1.04 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 20.0 mg/L full scale; second analytical range was dropped.

01/03/84 -Analytical range (RMCAMGL) was added; full scale: 5.00 mg/L. This range is currently restricted to special programs.

01/09/84 -Analytical range (RMCAMGH) was increased from 20.0 to 50.0 mg/L full scale. Calibration technique was changed from quadratric to linear interpolation. Magnesium is no longer determined simultaneously.

25/09/85 -Calibration range became 35.0 mg/L full scale; second analytical range was dropped. Commadore PET microcomputer controlled system with sample flow injection introduced.

1985 -Three analytical ranges were used during 1985: 5, 35, and 50 mg/L as Ca full scale.

CALCIUM
QUALITY CONTROL DATA FROM 07/01/86 TO 30/12/86

Lab: Atomic Absorbation

Analytical Range: 0.5 to 35.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	135	28.0	28.2	0.2	0.31
b :	136	2.45	2.47	0.02	0.046
a+b :	135	30.45	30.64	0.19	0.328
a-b :	135	25.55	25.69	0.14	0.307

s.d.(AB): Sw(within run): 0.22 S(between runs): 0.22 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

28.87 to 32.02 for A+B
 24.50 to 26.60 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	34	0.00 - 1.75	0.108	8.6
	159	1.75 - 3.50	0.228	8.9
	60	3.50 - 7.00	0.172	3.7
	28	7.00 - 17.50	0.306	2.6
	38	17.50 - 35.00	0.603	3.0
	319	Overall	0.343	N/A

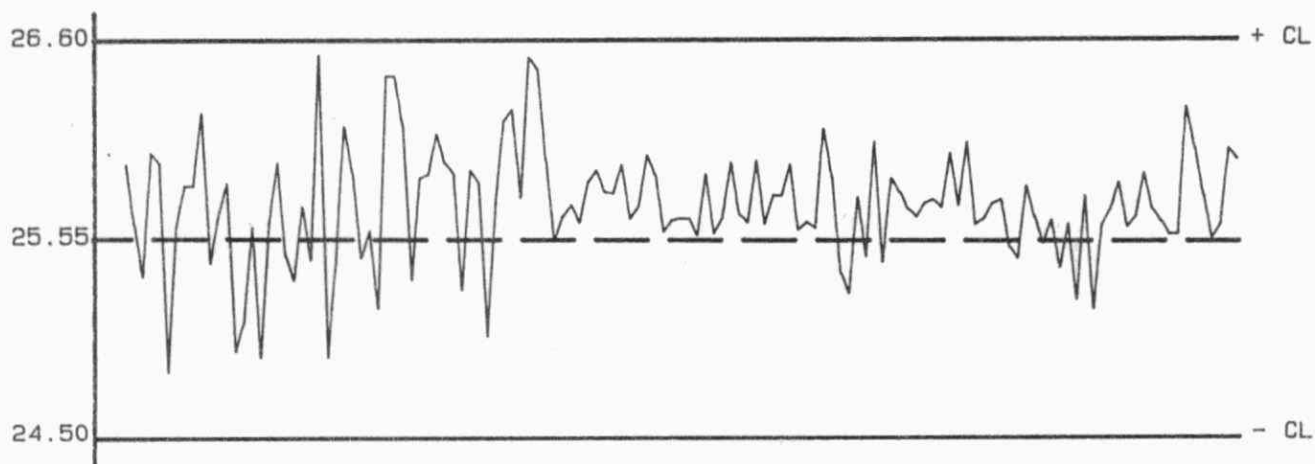
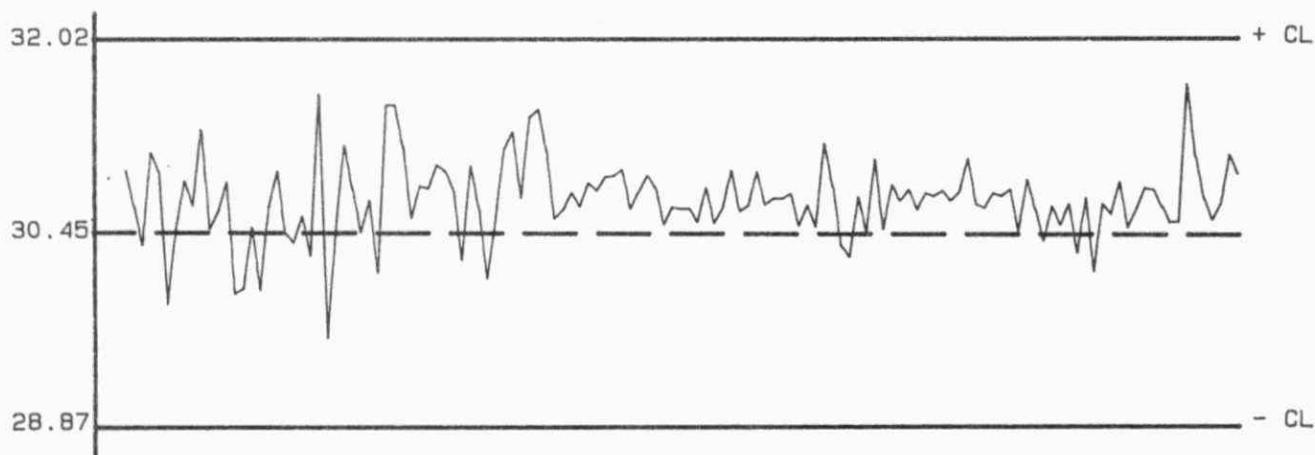
STANDARD DEVIATION (s.dupl): 0.108 W value: 0.1 T value: 0.5

OTHER CHECKS:

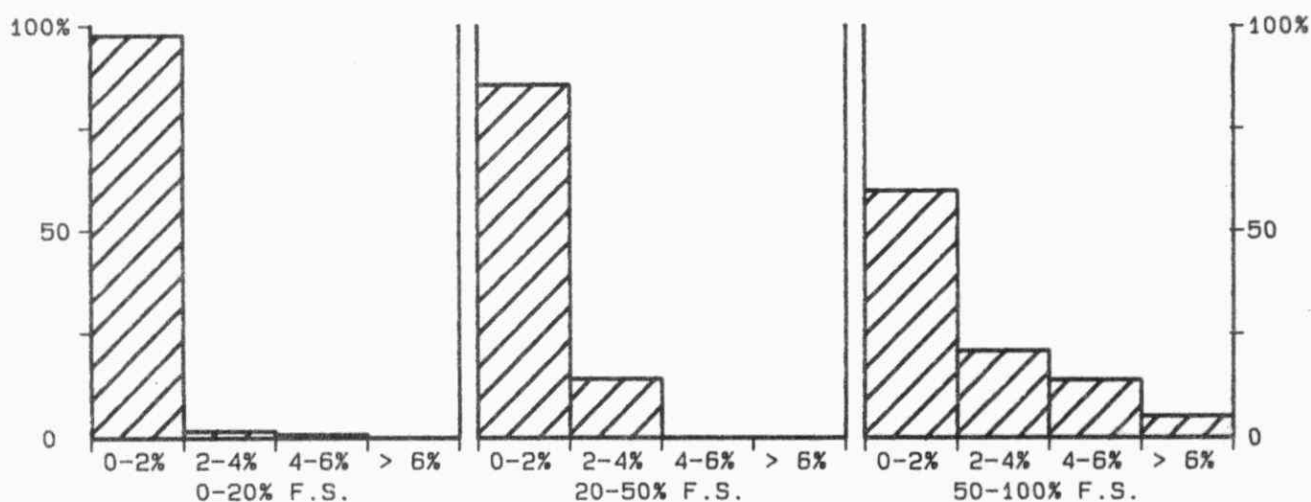
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	134	1.278	0.1138
Long Term Blank :	129	0.01	0.027

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 07/01/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 35 MG/L AS CA

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	08/04/86
LIS Test Name Code:	CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: F. Tomassini
Sample Type/Matrix: Domestic Waters, Leachates, Effluents, Sewage			

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 1.121 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards ever 20 samples

MODIFICATIONS:

01/07/82 -The method introduced on this date differed slightly from Method B for calcium in HAMES in that full scale for the analytical range was 50.0 mg/L; concentrations for the QC standards were also adjusted.

1985 -Three analytical ranges were used during 1985: 5, 35, and 50 mg/L as Ca full scale.

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 200 mg/L to 175 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

CALCIUM
QUALITY CONTROL DATA FROM 08/04/86 TO 31/12/86

Lab: Atomic Absorbtion

Analytical Range: 1 to 175.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	114	140.0	140.0	0.0	1.62
b :	114	12.25	12.27	0.02	0.408
a+b :	114	152.25	152.23	-0.02	1.687
a-b :	114	127.75	127.69	-0.06	1.657

s.d.(AB): Sw(within run): 1.17 S(between runs): 1.18 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

144.38 to 160.12 for A+B
 122.50 to 133.00 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0.00 - 8.75	0.282	8.3
24	8.75 - 17.50	0.612	4.6
59	17.50 - 35.00	0.898	3.2
121	35.0 - 87.5	1.43	2.4
67	87.5 - 175.0	3.92	3.3
289	Overall	2.11	N/A

STANDARD DEVIATION (s.dupl): 0.282

W value: 0.2

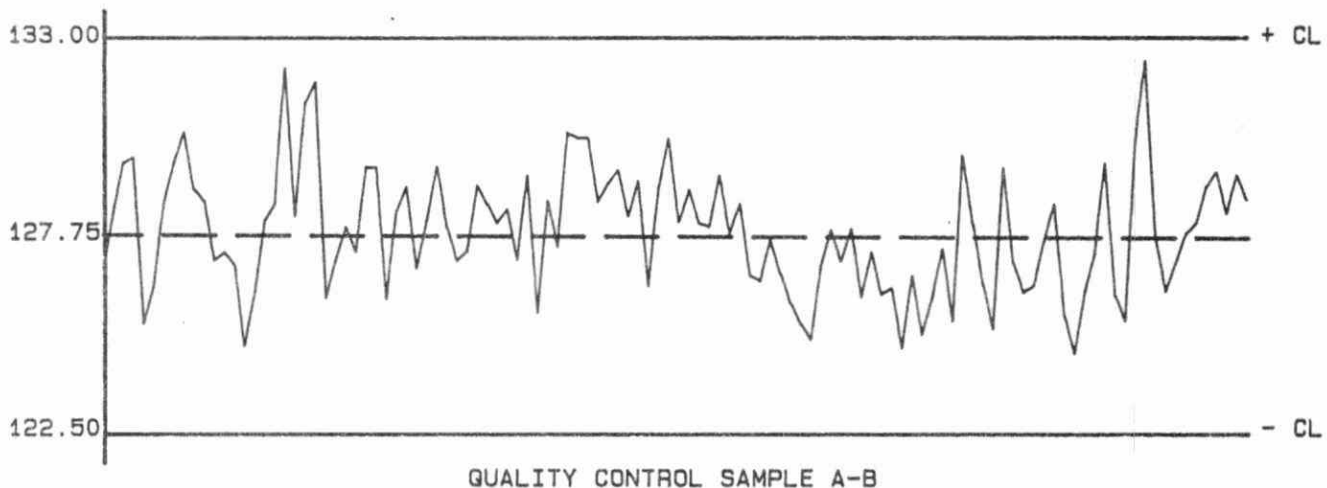
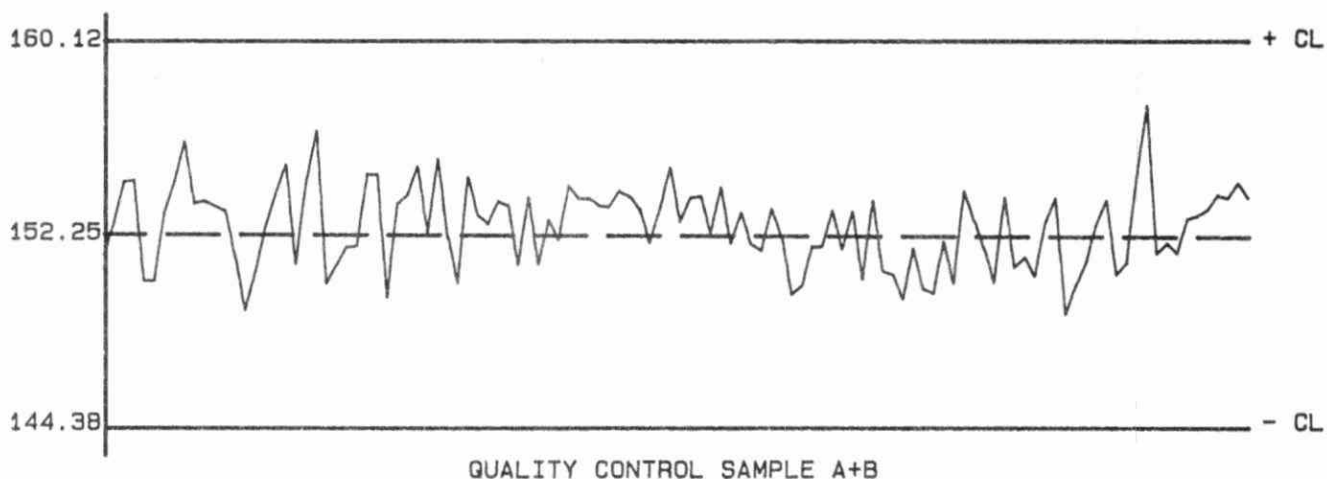
T value: 1

OTHER CHECKS:

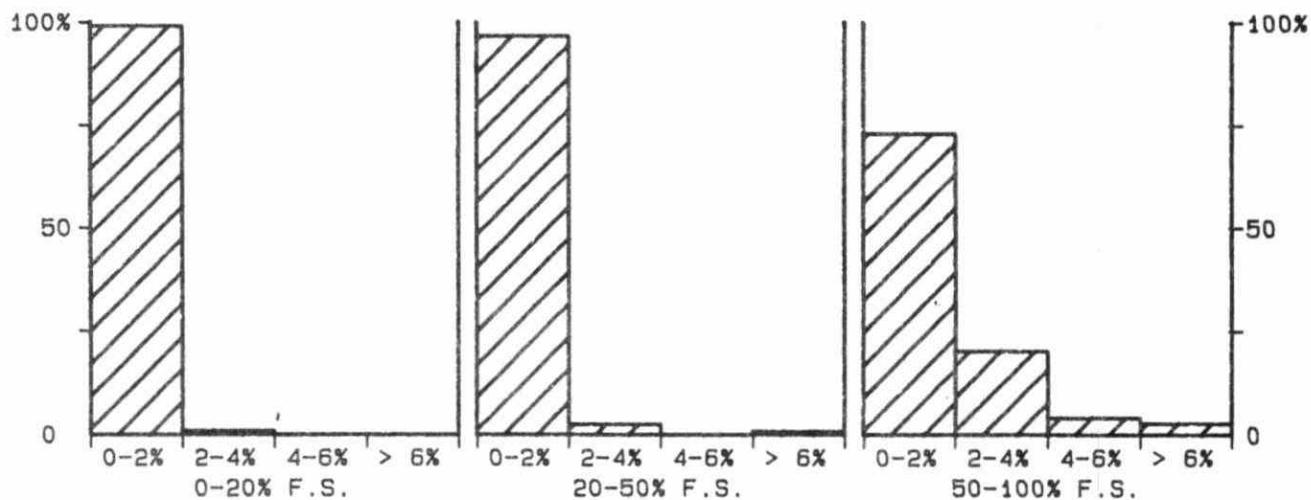
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	76	1.208	0.9753
Long Term Blank :	110	-0.00	0.304

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 08/04/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 175 MG/L AS CA

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Domestic Water	Method Introduced:	01/07/82
LIS Test Name Code:	CAUR	Units	: mg/L as Ca
Work Station Code	: WCAMGH	Unit Code	: 064820
Method Code	: 002AA1	Supervisor	: P. Campbell
Sample Type/Matrix:	Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required: 100 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 0.16 at the full scale level.

INSTRUMENTATION:

Automated modular continuous flow atomic absorption system (AAS). Two analytical ranges are obtained from the output of the AAS.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 3 standards

MODIFICATIONS:

01/07/82 -The method introduced on this date differed slightly from Method B for calcium in HAMES in that full scale was 50.0 mg/L; concentrations of QC standards were also adjusted.

08/04/86 -THIS TEST WAS ASSIGNED TO THE WAAS WORKSTATION.

CALCIUM
QUALITY CONTROL DATA FROM 02/01/86 TO 10/03/86

Lab: Domestic Water

Analytical Range: 1 to 200 mg/l as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	26	130	132	2	1.0
b :	26	33	33	0	0.7
a+b :	26	163	165	2	1.4
a-b :	26	97	98	2	1.0
c :	26	32.5	33.3	0.8	0.46
d :	26	6.5	6.6	0.1	0.20
c+d :	26	39.0	39.9	0.9	0.54
c-d :	26	26.0	26.7	0.7	0.45

s.d.(AB): Sw(within run): 0.7 S(between runs): 0.9 S/Sw: 1.22
s.d.(CD): Sw(within run): 0.32 S(between runs): 0.35 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

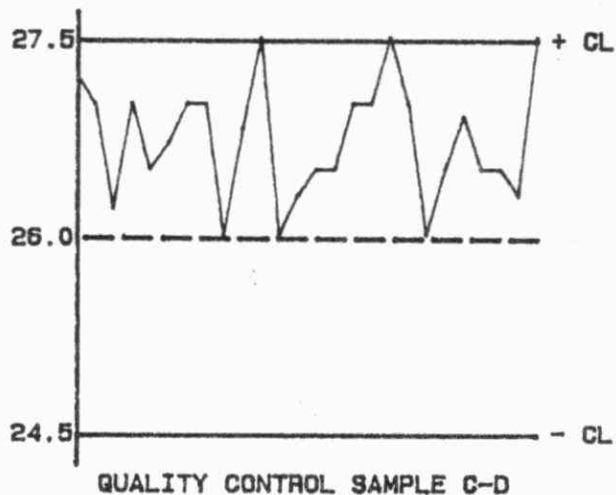
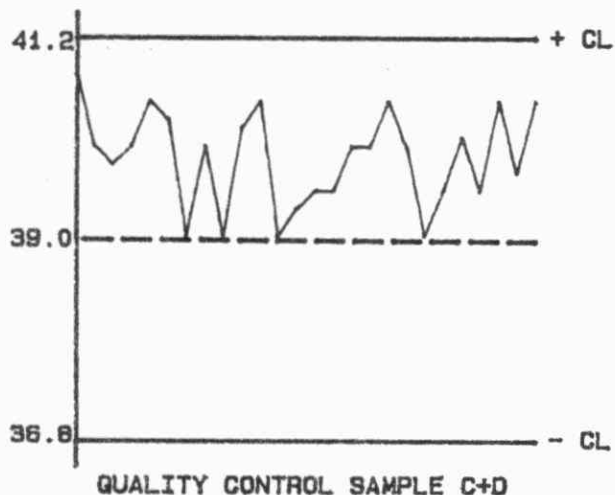
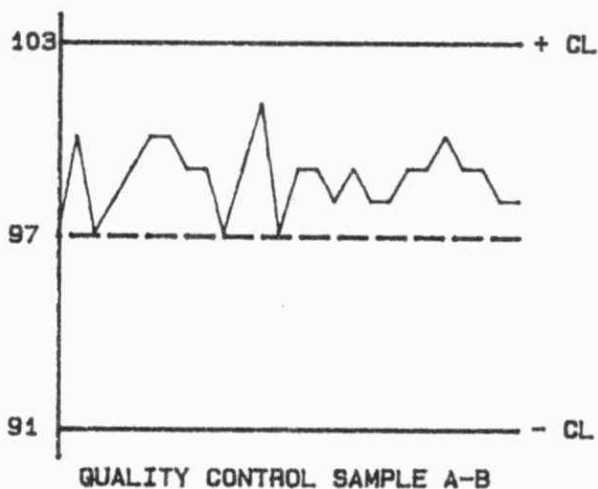
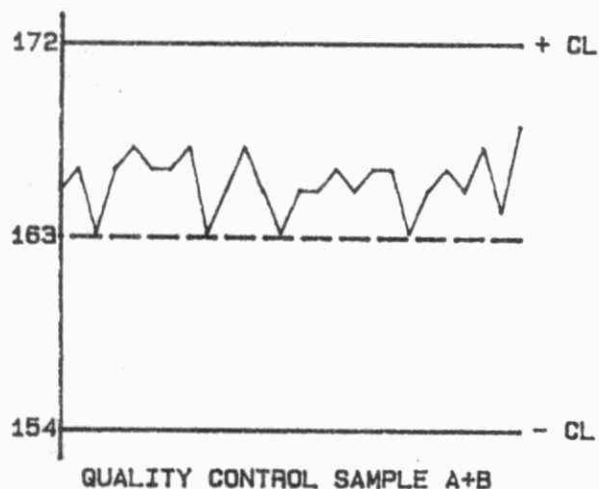
154 to 172 for A+B
91 to 103 for A-B
36.8 to 41.2 for C+D
24.5 to 27.5 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	9	0.0 - 10.0	0.21	6.5
	5	10.0 - 20.0	0.39	2.6
	29	20.0 - 50.0	0.64	2.0
	13	50 - 100	1.2	1.6
	11	100 - 200	1.1	0.8
	67	Overall	0.8	N/A

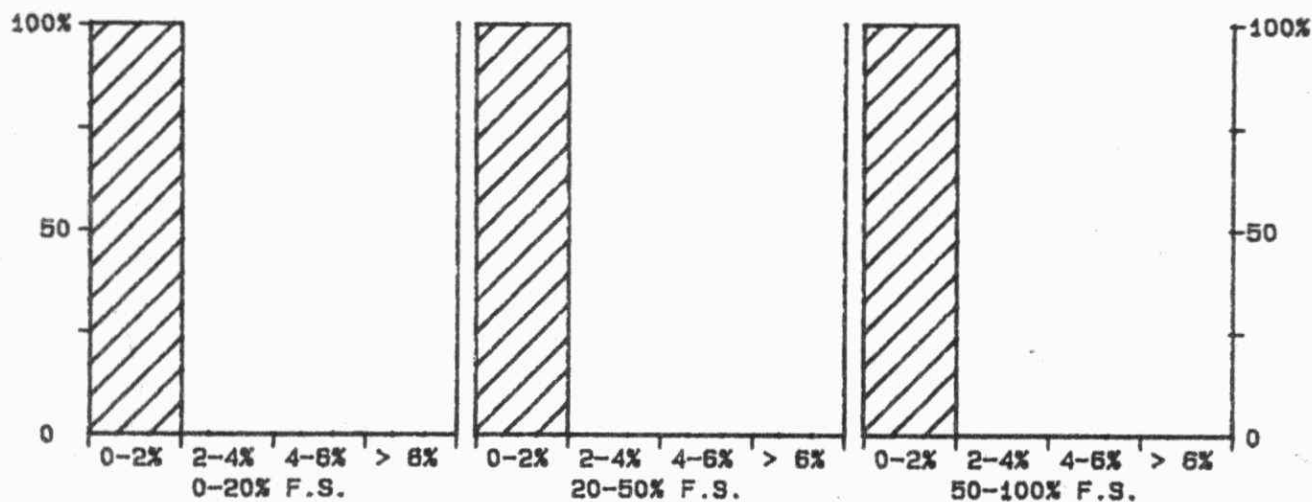
STANDARD DEVIATION (s.dup1): 0.21 W value: 0.2 T value: 1

QUALITY CONTROL GRAPHS CALCIUM (MG/L AS CA)

FROM: 02/01/86
TO: 10/03/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CA

*** CALCIUM - SOIL (Xsc) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	CAESC	Units	: meq/100g Ca
Work Station Code	: DOLOCATION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 6 g (dry <2 mm)
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Ca by AAS at 422.7 with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. Aluminum, magnesium, and potassium are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -3g sample used for all soil types (6g previously used for sandy soils)
01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown--average value used.

CALCIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 01/10/86 TO 31/12/86

Lab: Dorset Soils

Analytical Range: 0.1 to 5.00 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	3.75	N/A	N/A	N/A
b :	0	1.25	N/A	N/A	N/A
a+b :	0	5.00	N/A	N/A	N/A
a-b :	0	2.50	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.63 to 5.37 for A+B
 2.25 to 2.75 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	14	0.22	0.22	0.041
r2 :	14	17.35	17.35	2.138
r3 :	14	2.65	2.65	0.362

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
18	0.00 - 1.00	0.037	8.2
22	1.00 - 2.50	0.087	5.1
13	2.50 - 5.00	0.225	6.1
53	Overall	0.126	N/A

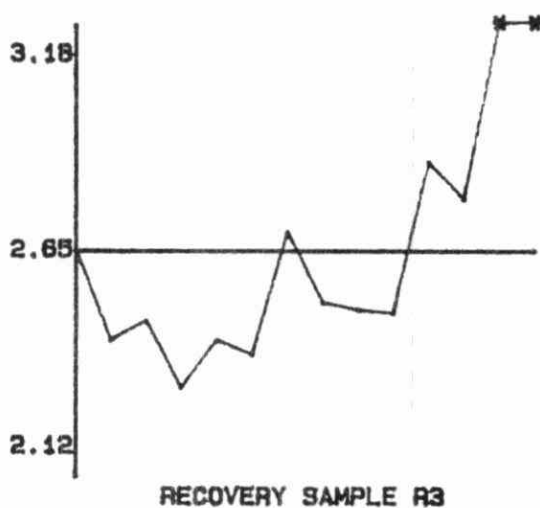
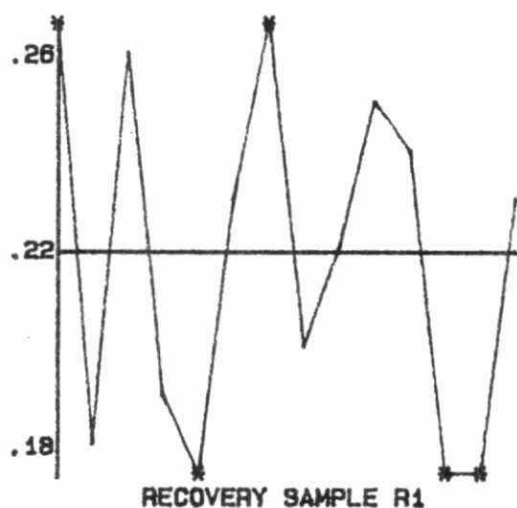
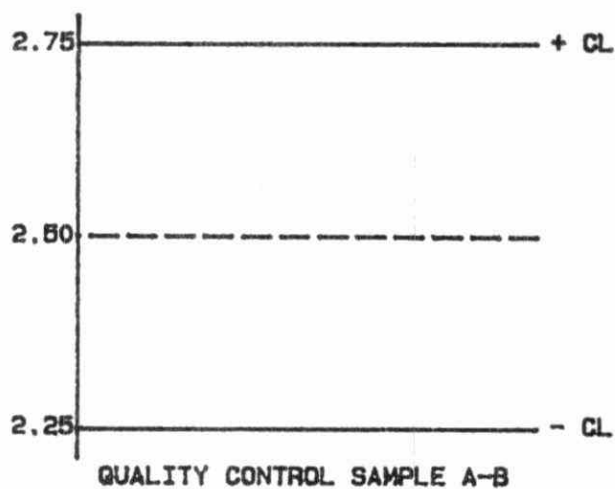
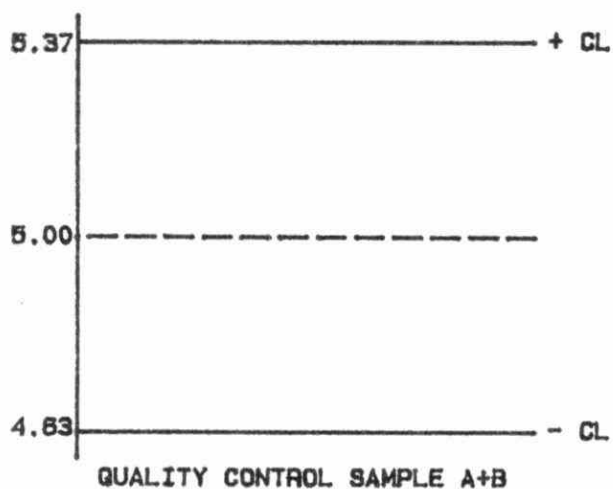
STANDARD DEVIATION (s.dupl): 0.037 W value: 0.02 T value: 0.1

OTHER CHECKS:

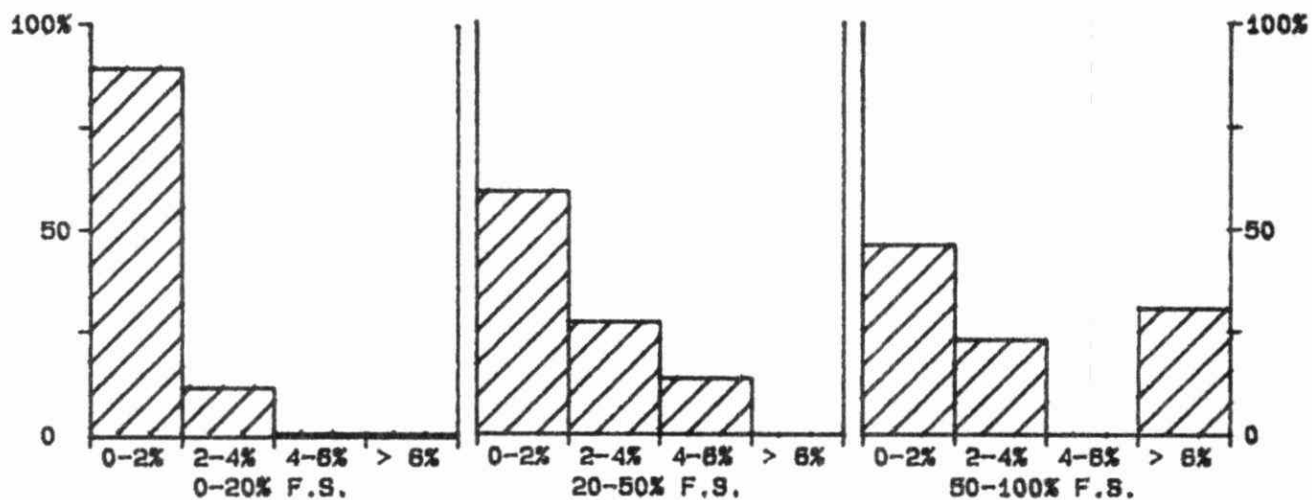
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	14	0.05	0.032

QUALITY CONTROL GRAPHS CALCIUM - SOIL (XSC) (MEQ/100G)

FROM: 01/10/88
TO: 31/12/88



* DATA > 15% OUTSIDE CL



*** CARBON - DISSOLVED INORGANIC ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/78
LIS Test Name Code:	DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes			

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level

N.B. Dissolved organic carbon, chloride, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 1 standard daily

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; standard every 20 samples

MODIFICATIONS:

04/03/86 -Test transferred from ROC to ROM workstation. HP9820 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 1 to 7.

DISSOLVED INORGANIC CARBON
QUALITY CONTROL DATA FROM 04/03/86 TO 30/12/86

Lab: Colourimetry

Analytical Range: 1 to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	168	32.0	32.6	0.6	1.07
b :	168	8.0	8.1	0.1	0.38
a+b :	168	40.0	40.6	0.6	1.31
a-b :	168	24.0	24.5	0.5	0.94
c :	168	8.0	8.1	0.1	0.38
d :	168	2.0	2.1	0.1	0.20
c+d :	168	10.0	10.2	0.2	0.53
c-d :	168	6.0	6.0	0.0	0.29

s.d.(AB): Sw(within run): 0.66 S(between runs): 0.80 S/Sw: 1.21
s.d.(CD): Sw(within run): 0.21 S(between runs): 0.30 S/Sw: 1.48

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.2 to 41.8 for A+B
22.8 to 25.2 for A-B
8.2 to 11.8 for C+D
4.8 to 7.2 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	187	0.0 - 4.0	0.31	33.0
	18	4.0 - 8.0	1.93	33.0
	74	8.0 - 20.0	0.98	6.3
	70	20.0 - 40.0	0.88	3.2
	349	Overall	0.77	N/A

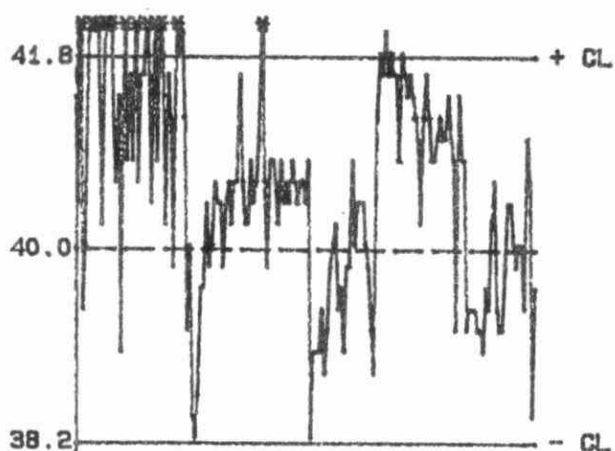
STANDARD DEVIATION (s.dupl): 0.31 W value: 0.2 T value: 1

OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	166	0.2	0.19

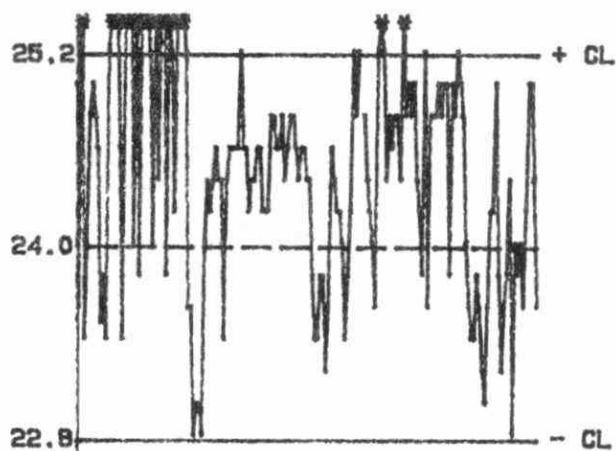
QUALITY CONTROL GRAPHS DISSOLVED INORGANIC CARBON (MG/L AS C)

FROM: 04/03/86

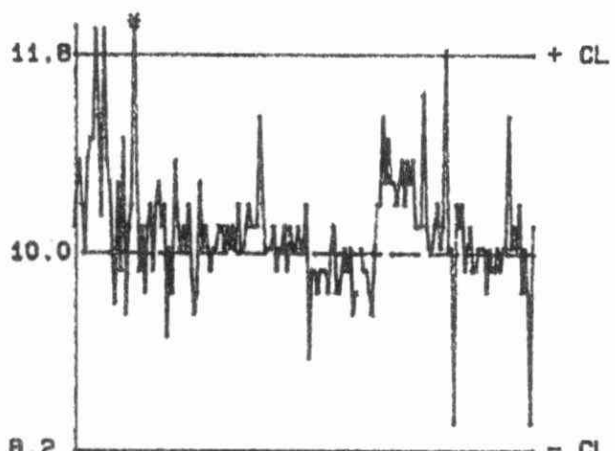
TO: 30/12/86



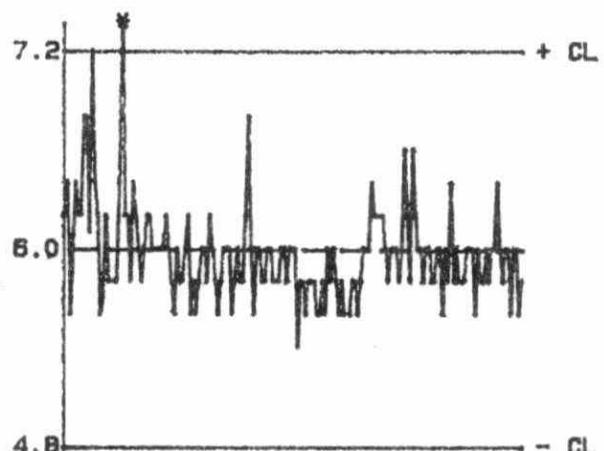
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

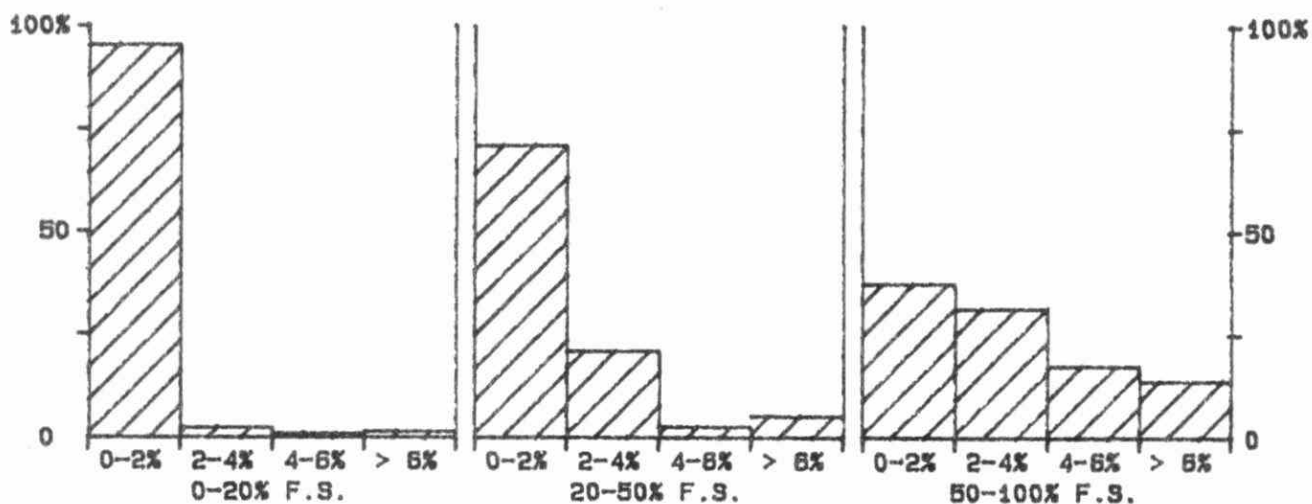


QUALITY CONTROL SAMPLE C+D



QUALITY CONTROL SAMPLE C-D

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 MG/L AS C

*** CARBON - DISSOLVED INORGANIC ***

IDENTIFICATION:

Laboratory : Rivers and Lakes Method Introduced: 01/04/78
LIS Test Name Code: DIC Units : mg/L as C
Work Station Code : ROC Unit Code : 064806
Method Code : 102AC2 Supervisor : J. Crowther
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents,
Domestic Water Supplies, Leachates, Sewages, Industrial Wastes

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.4 at the full scale level.

N.B. Dissolved organic carbon is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 1 standard daily. BL plus 4 standards whenever a new stock of buffer is prepared.

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL plus 1 standard

NOTES:

04/03/86 -DISCONTINUED

TEST TRANSFERRED TO ROM WORKSTATION

CARBON - DISSOLVED INORGANIC
QUALITY CONTROL DATA FROM 02/01/86 TO 27/02/86

Lab: Rivers and Lakes

Analytical Range: 1 to 40.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	19	30.00	30.00	-0.00	0.432
b :	19	10.00	10.43	0.43	0.224
a+b :	19	40.00	40.43	0.43	0.633
a-b :	19	20.00	19.57	-0.43	0.269

s.d.(AB): Sw(within run): 0.190 S(between runs): 0.344 S/Sw: 1.81

On any given day the calibration is accepted if the values obtained lie within the ranges:

37.60 to 42.40 for A+B
 18.40 to 21.60 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
23	0.00 - 4.00	0.289	19.4
2	4.00 - 10.00	1.170	20.7
2	10.00 - 20.00	0.219	1.4
3	20.00 - 40.00	0.245	0.8
30	Overall	0.406	N/A

STANDARD DEVIATION (s.dup1): 0.289

W value: 0.2

T value: 1

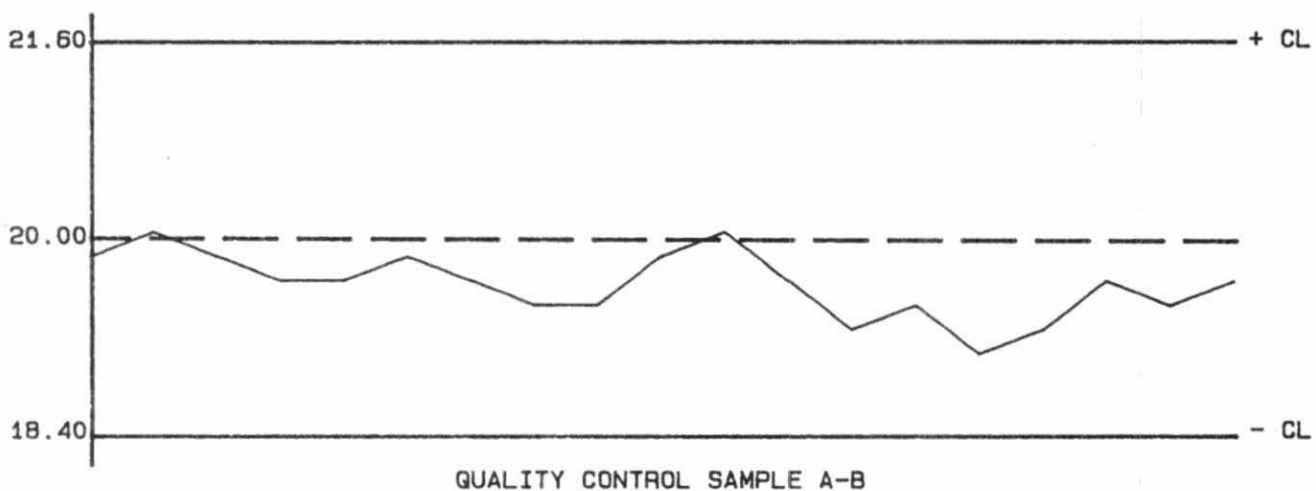
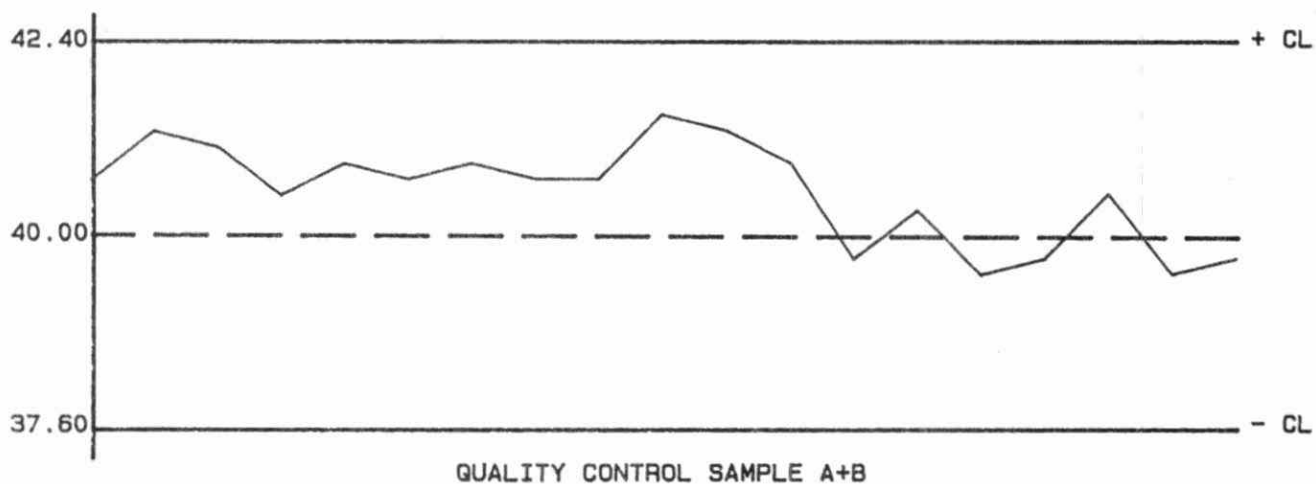
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	19	479	25.4
Long Term Blank :	19	0.2	0.11

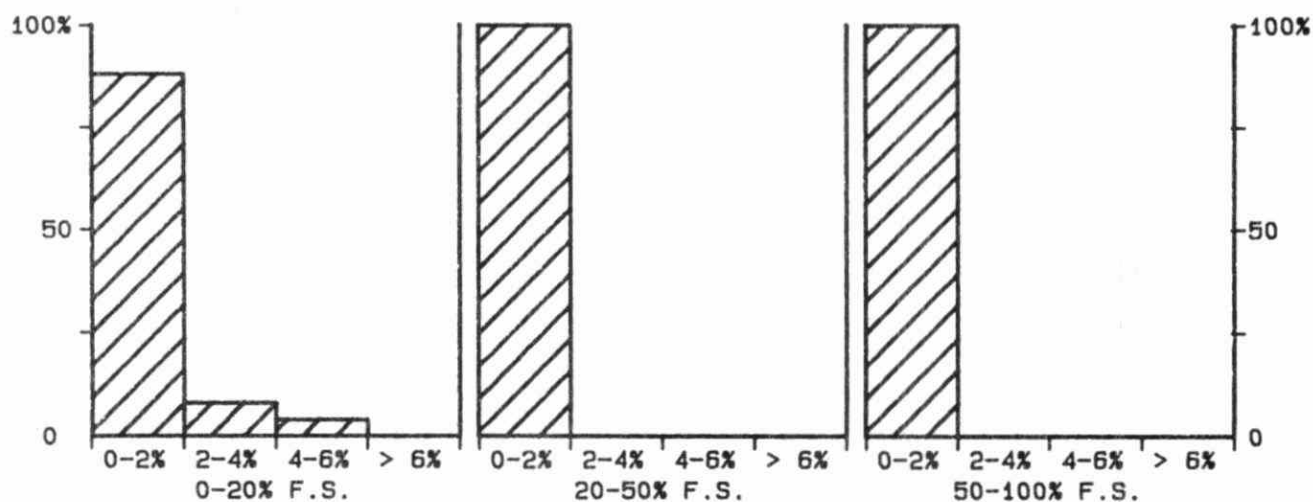
QUALITY CONTROL GRAPHS CARBON - DISSOLVED INORGANIC (MG/L AS C)

FROM: 02/01/86

TO: 27/02/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 MG/L AS C

*** CARBON - DISSOLVED INORGANIC ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	03/06/80
LIS Test Name Code:	DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: F. Tomassini
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes			

SAMPLING:

Quantity Required: 50 mL
Container : Pyrex culture tubes plus screw caps with cone-shaped liners

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO₂-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 1 standard daily

CONTROLS:

Calibration : LTBL plus 4 standards, eg, QCA
Drift : BL every 10 samples and BL plus 1 standard every 20 samples.

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on measured averages rather than expected concentrations.

CARBON - DISSOLVED INORGANIC
QUALITY CONTROL DATA FROM 07/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 0.1 to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	158	6.4	6.7	0.3	0.17
b :	158	2.2	2.2	0.0	0.11
a+b :	158	8.6	8.9	0.3	0.25
a-b :	158	4.2	4.5	0.3	0.15
c :	157	1.39	1.51	0.12	0.084
d :	158	0.63	0.65	0.02	0.068
c+d :	157	2.02	2.16	0.14	0.137
c-d :	157	0.76	0.86	0.10	0.068

s.d.(AB): Sw(within run): 0.11 S(between runs): 0.14 S/Sw: 1.35
s.d.(CD): Sw(within run): 0.048 S(between runs): 0.076 S/Sw: 1.59

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.0 to 9.2 for A+B
3.8 to 4.6 for A-B
1.72 to 2.32 for C+D
0.56 to 0.96 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	74	0.00 - 0.50	0.020	5.3
	147	0.50 - 1.00	0.019	2.5
	162	1.00 - 2.00	0.072	4.9
	86	2.0 - 5.0	0.07	2.2
	2	5.00 - 10.00	0.200	2.3
	471	Overall	0.054	N/A

STANDARD DEVIATION (s.dupl): 0.020

W value: 0.02

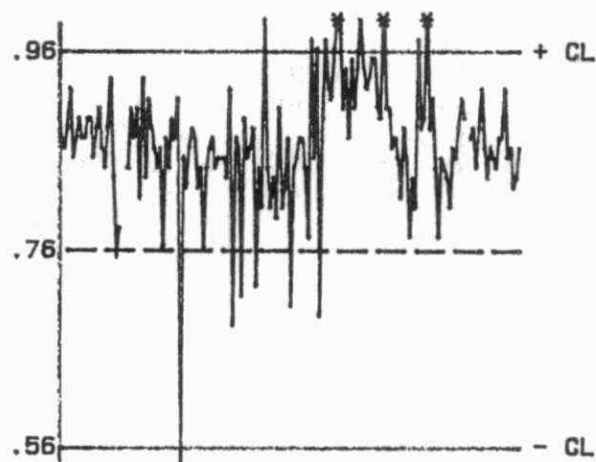
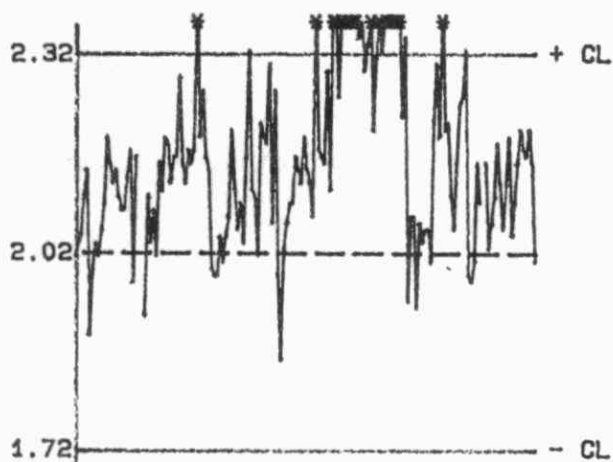
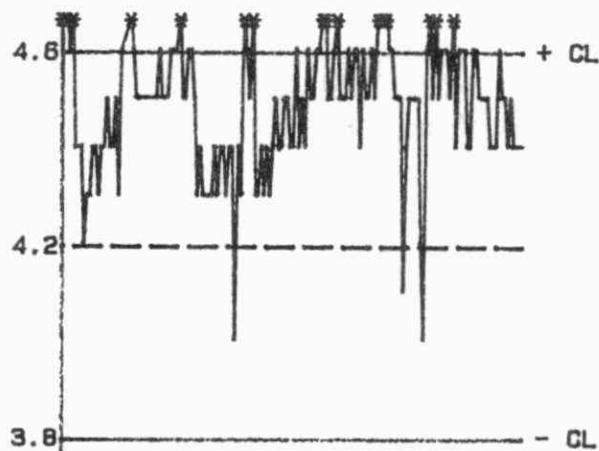
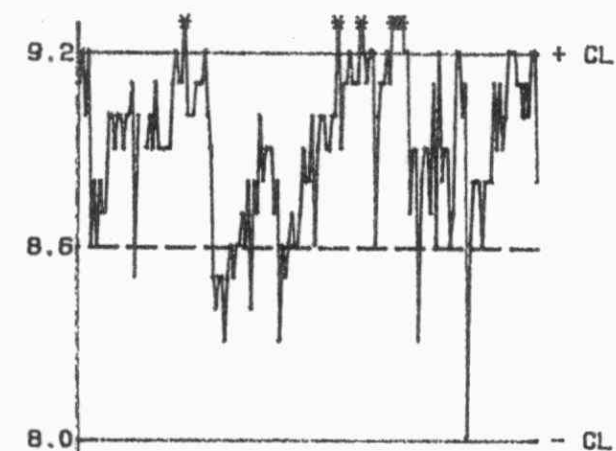
T value: 0.1

OTHER CHECKS:

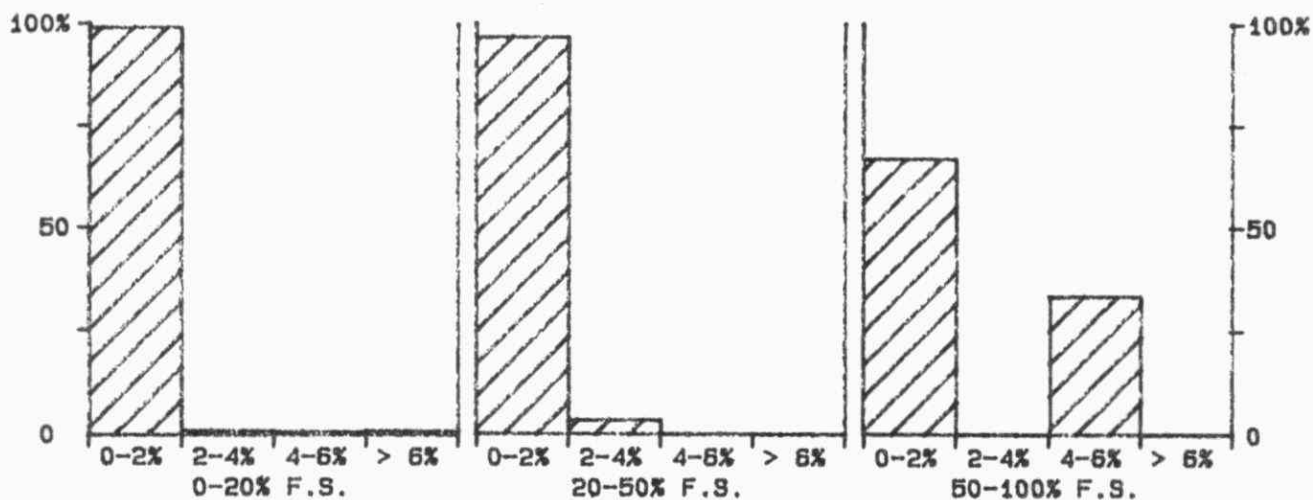
	Number of Data	Data Mean	Standard(1) Deviation
STD. CAL.	160	571	93.5
Long Term Blank	156	0.18	0.048

QUALITY CONTROL GRAPHS CARBON - DISSOLVED INORGANIC (MG/L AS C)

FROM: 07/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS C

*** CARBON - DISSOLVED ORGANIC ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/78
LIS Test Name Code:	DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Waters, Leachates, Sewages, Industrial Wastes			

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas (500 mL/min) to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light(UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level

N.B. Dissolved inorganic carbon, chloride and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) gas supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standard daily

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL every 10 samples; standard every 20 samples

MODIFICATIONS:

04/03/86 -Test transferred from ROC to ROM workstation. HP9820 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 1 to 7.

DISSOLVED ORGANIC CARBON
QUALITY CONTROL DATA FROM 04/03/86 TO 30/12/86

Lab: Colourimetry

Analytical Range: 1 to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	171	16.0	16.1	0.1	0.34
b :	170	4.0	4.0	0.0	0.19
a+b :	170	20.0	20.1	0.1	0.41
a-b :	170	12.0	12.0	0.0	0.37
c :	170	4.0	4.0	0.0	0.19
d :	171	1.0	1.0	0.0	0.11
c+d :	170	5.0	5.1	0.1	0.24
c-d :	170	3.0	3.0	0.0	0.19

s.d.(AB): SW(within run): 0.26 S(between runs): 0.28 S/SW: 1.05
s.d.(CD): SW(within run): 0.13 S(between runs): 0.16 S/SW: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.1 to 20.9 for A+B
11.4 to 12.6 for A-B
4.1 to 5.9 for C+D
2.4 to 3.6 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	105	0.0 - 2.0	0.26	21.1
	163	2.0 - 4.0	0.47	16.1
	115	4.0 - 10.0	0.98	16.2
	45	10.0 - 20.0	2.46	18.1
	428	Overall	1.00	N/A

STANDARD DEVIATION (s.dup1): 0.26 W value: 0.2 T value: 1

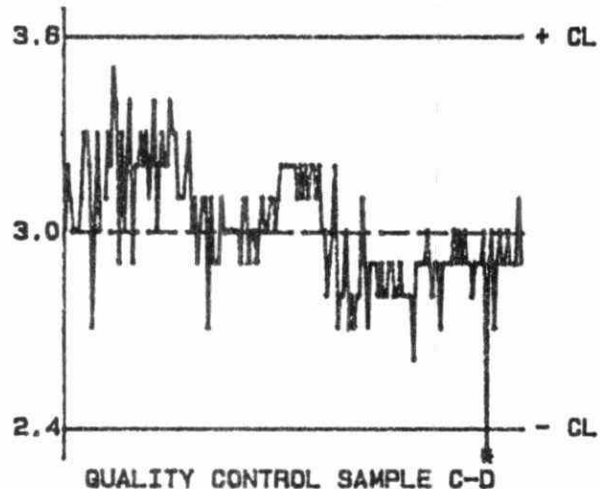
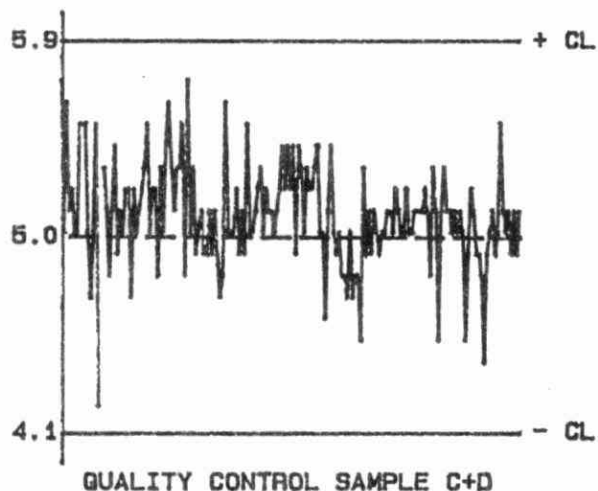
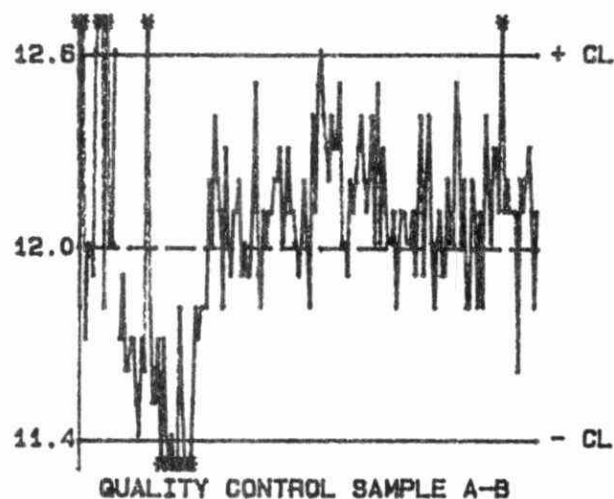
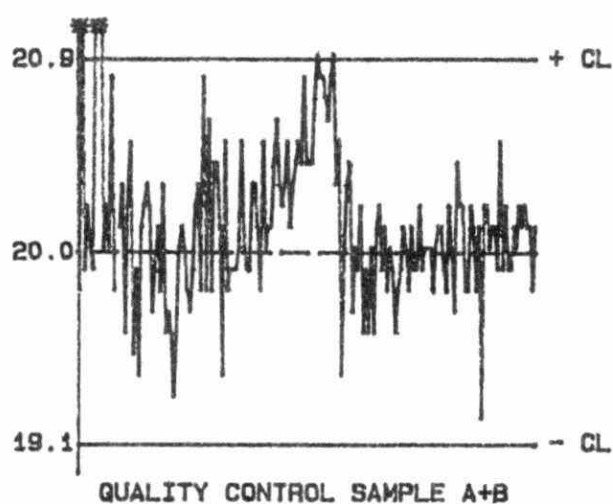
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	170	0.1	0.14

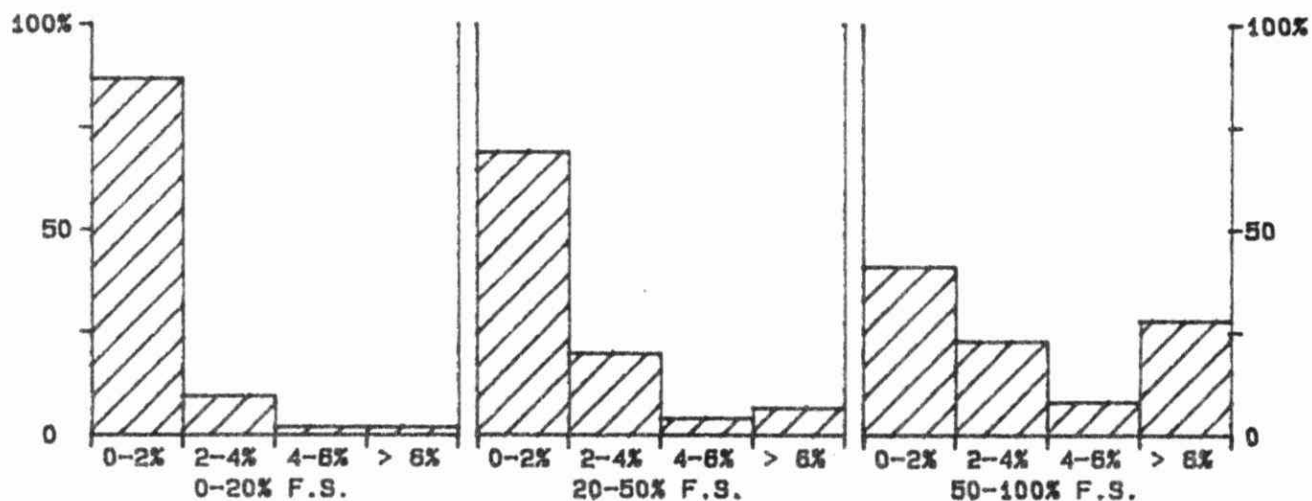
QUALITY CONTROL GRAPHS DISSOLVED ORGANIC CARBON (MG/L AS C)

FROM: 04/03/86

TO: 30/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS C

*** CARBON - DISSOLVED ORGANIC ***

IDENTIFICATION:

Laboratory : Rivers and Lakes Method Introduced: 01/04/78
LIS Test Name Code: DOC Units : mg/L as C
Work Station Code : ROC Unit Code : 064806
Method Code : 102AC2 Supervisor : J. Crowther
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents,
Domestic Waters, Leachates, Sewages, Industrial Wastes

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas(500 mL/min) to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light(UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.

Approximate absorbance: 0.3 at the full scale level.

N.B. Dissolved inorganic carbon is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO₂-free) gas supplies with flow controls, dialysis unit, UV digester. Colourimetric measurement is through a 5.0 cm. light path at 550 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 1 standard daily. BL plus 4 standards whenever a new stock of buffer is prepared.

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL plus 1 standard

NOTES:

04/03/86 -DISCONTINUED.
TEST TRANSFERRED TO ROM WORKSTATION.

CARBON - DISSOLVED ORGANIC
QUALITY CONTROL DATA FROM 02/01/86 TO 27/02/86

Lab: Rivers and Lakes

Analytical Range: 0.5 to 20.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	19	15.00	14.88	-0.12	0.157
b :	19	5.00	5.00	-0.00	0.105
a+b :	19	20.00	19.88	-0.12	0.229
a-b :	19	10.00	9.88	-0.12	0.138

s.d.(AB): Sw(within run): 0.098 S(between runs): 0.134 S/Sw: 1.37

On any given day the calibration is accepted if the values obtained lie within the ranges:

18.80 to 21.20 for A+B
9.20 to 10.80 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	12	0.00 - 2.00	0.122	11.3
	29	2.00 - 5.00	0.109	3.0
	20	5.00 - 10.00	0.123	1.7
	2	10.00 - 20.00	0.112	0.7
	63	Overall	0.116	N/A

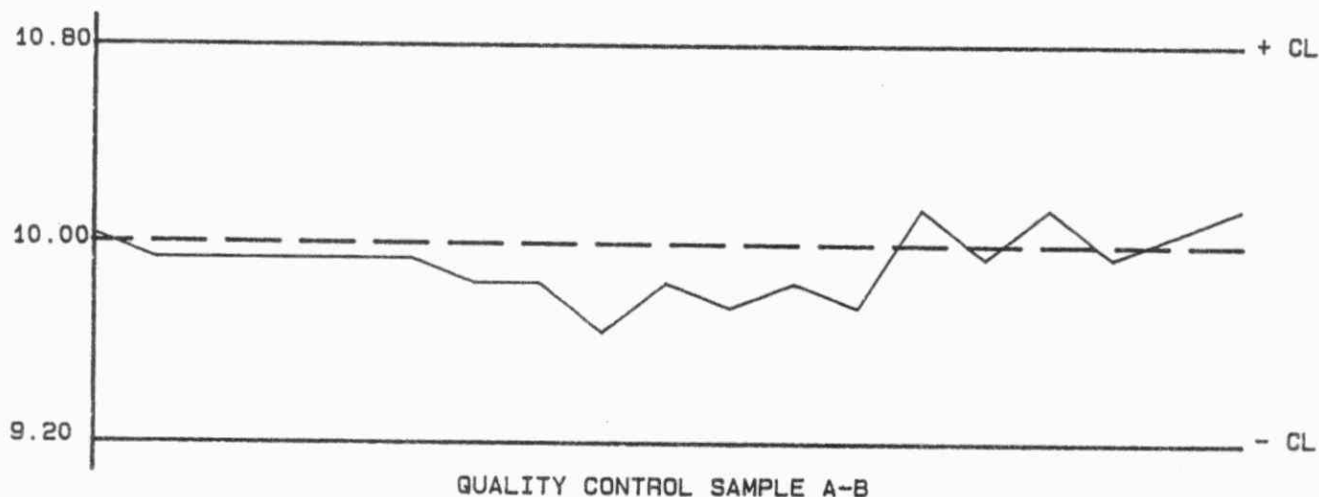
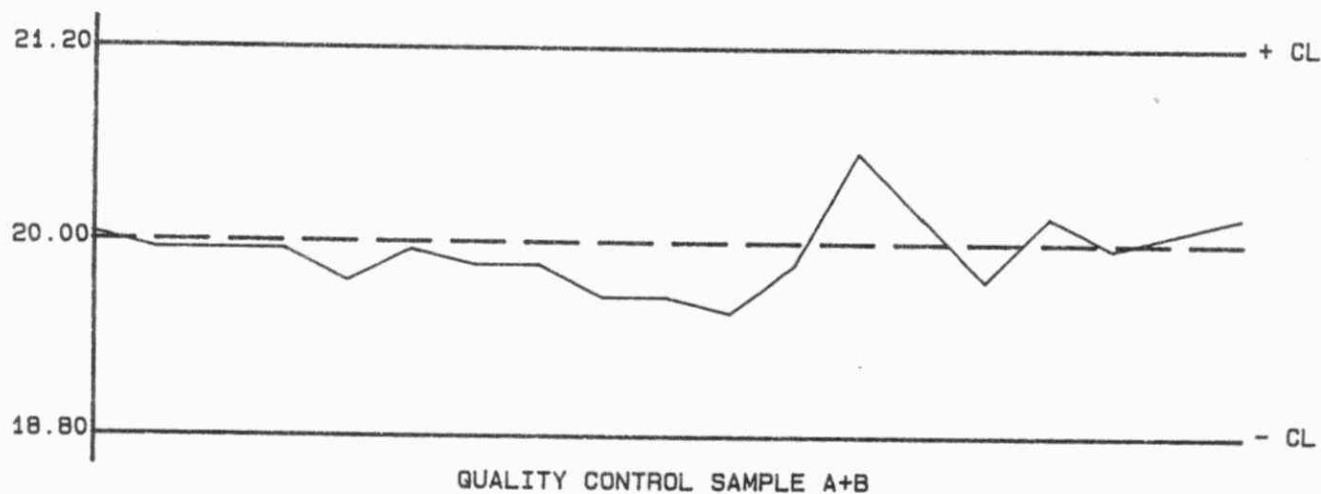
STANDARD DEVIATION (s.dup1): 0.122 W value: 0.1 T value: 0.5

OTHER CHECKS:

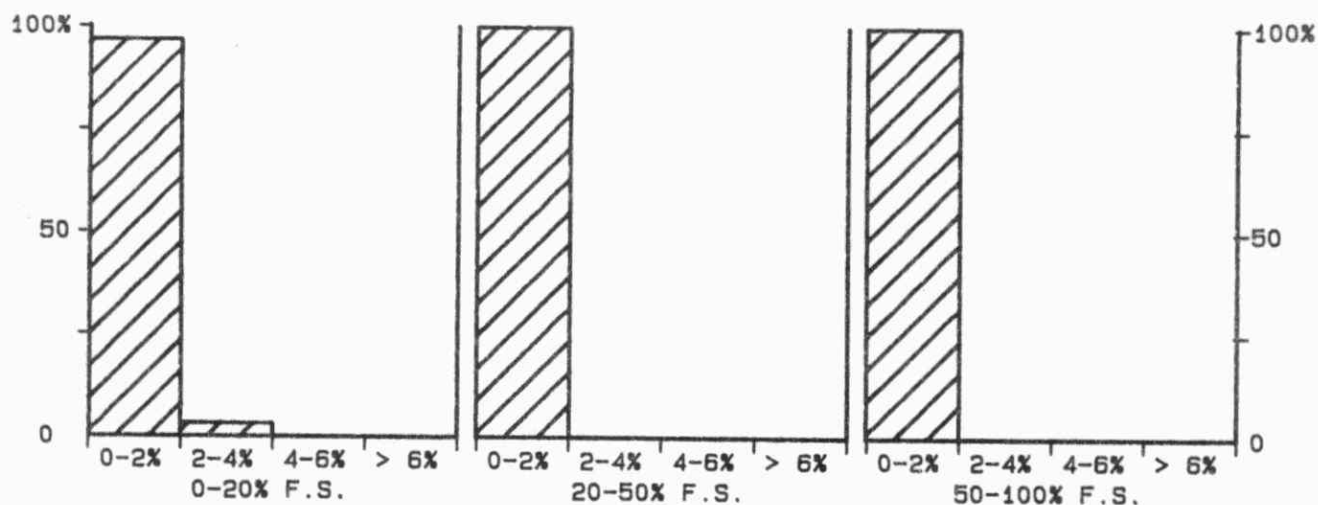
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	19	594	35.1
Long Term Blank :	19	0.0	0.03

QUALITY CONTROL GRAPHS CARBON - DISSOLVED ORGANIC (MG/L AS C)

FROM: 02/01/86
TO: 27/02/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** ORGANIC CARBON - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/10/80
LIS Test Name Code:	ORGC	Units	: % organic carbon
Work Station Code	: DOOXMAT	Unit Code	: 500806
Method Code	: CALCO1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 0.1 to 0.5 g dried (<150 um)
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

The percentage by weight of organic carbon in a soil sample is calculated as the difference between total carbon and inorganic carbon. Total carbon is determined by a Leco CR-12 or a Leco WR112. Inorganic carbon (carbonate C) is determined coulometrically after reaction of the sample in HCl.

INSTRUMENTATION:

Leco CR-12 or Leco WR112
(for analysis of inorganic carbon see Inorganic Carbon - Soil)

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 0.5

CONTROLS:

RS-85 soil/sediment control, sucrose

MODIFICATION:

01/01/81 -Samples analyzed by the Modified Walkly-Black procedure.
01/01/82 -Samples analyzed by routine COD method in the WQS.
01/01/83 -Samples analyzed by method developed for colourmetric analysis of chromium (ie. wet digestion-dichromate/H₂SO₄).
01/01/84 -Samples analysed for total carbon Leco CR-12 or Leco WR112. Organic carbon is determined by subtracting the inorganic carbon from the total carbon.

ORGANIC CARBON - SOIL
QUALITY CONTROL DATA FROM 01/04/86 TO 05/05/86

Lab: Dorset Soils

Analytical Range: 0.5 to 100 % organic carbon

RECOVERIES:

	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
r1 :	14	12.00	12.12	0.341
r2 :	13	3.32	3.33	0.049

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
40	0.0 - 10.0	0.12	2.8
13	10 - 30	0.6	3.4
2	30 - 60	1.1	3.2
0	60 - 100	N/A	N/A
55	Overall	0.4	N/A

STANDARD DEVIATION (s.dupl):

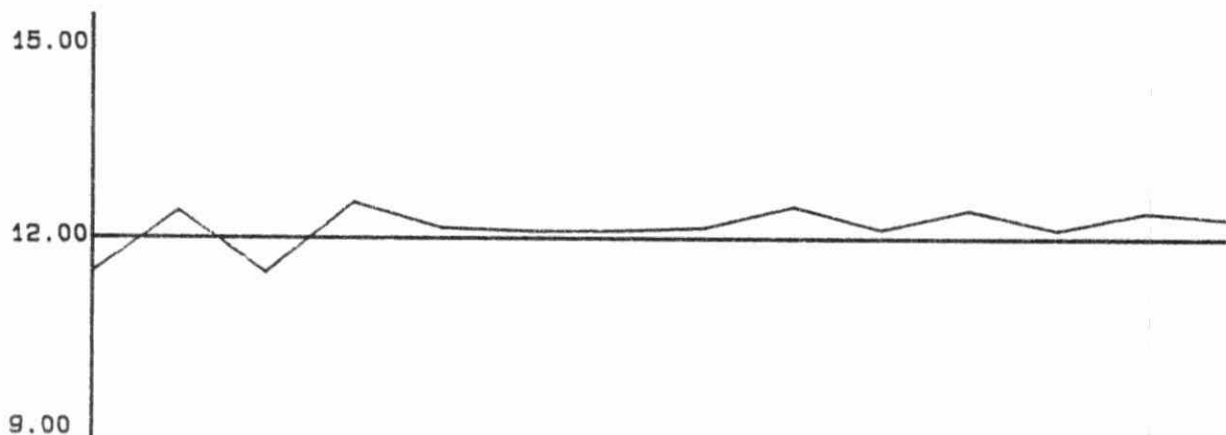
0.12

W value: 0.1

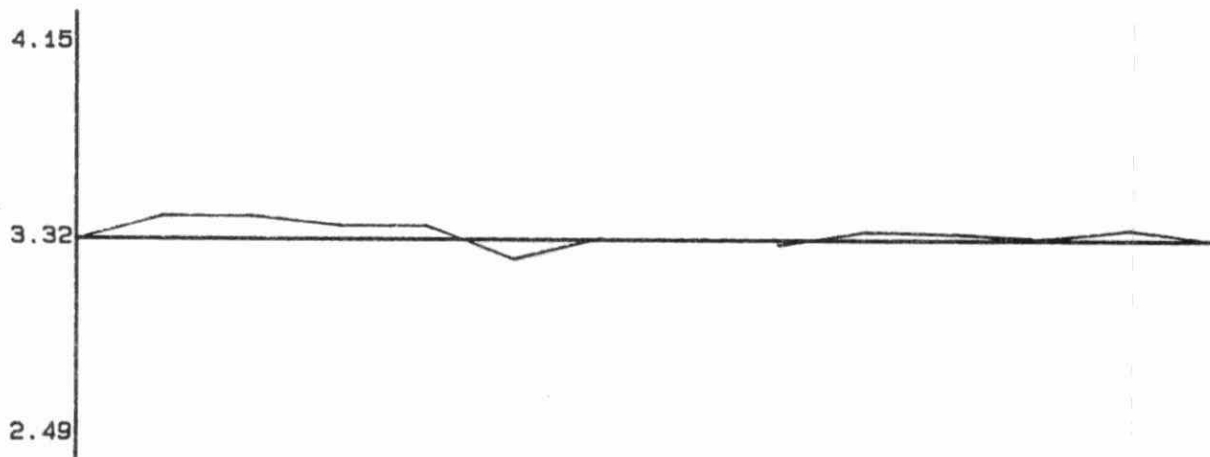
T value: 0.5

QUALITY CONTROL GRAPHS ORGANIC CARBON - SOIL (% ORGANIC CARBON)

FROM: 01/04/86
TO: 05/05/86

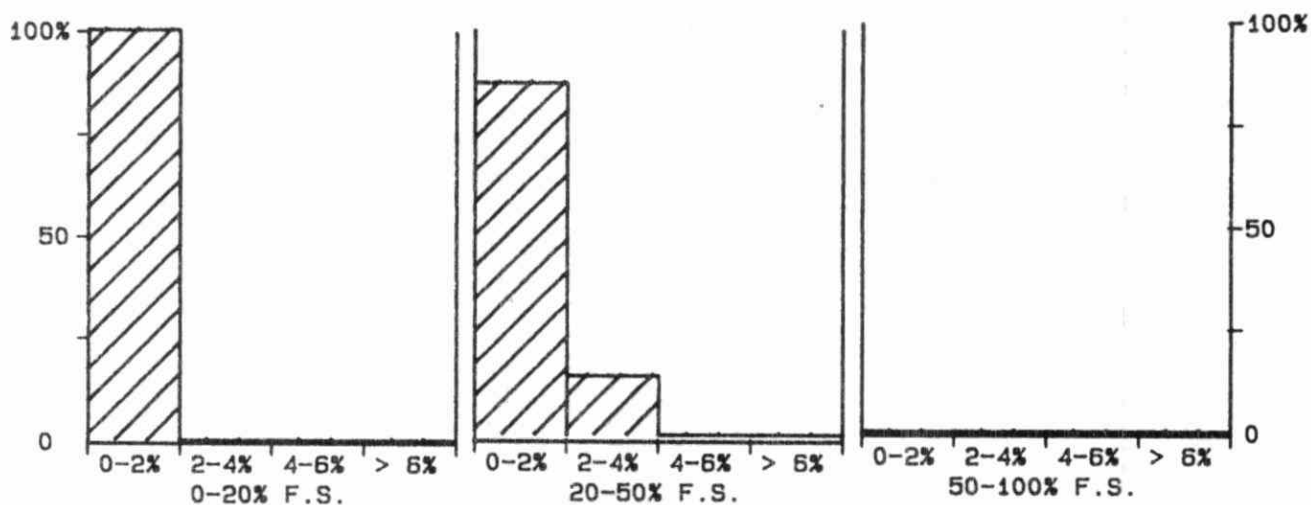


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % ORGANIC CARBON

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/05/75
LIS Test Name Code:	CLIDUR	Units	: mg/L as Cl
Work Station Code	: ROM	Unit Code	: 064860
Method Code	: 004AC1	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Soil Extracts, Effluents, Domestic Waters, Leachates, Sewage, Industrial Waste			

SAMPLING:

Quantity Required: 10 ml
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically. A reference stream, from which mercuric thiocyanate has been eliminated, is utilized to compensate for sample matrix effects. Approximate absorbance: 0.5 at the full scale level. N.B. Reactive silicates, dissolved inorganic and organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm. light path at 470 nm.
Data capture, reduction, and processing via a microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL every 10 samples; standard every 20 samples

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10, and concentrations of QC standards were adjusted. The analytical rate was tripled.

12/03/86 -Boxed-FIA system discontinued. Basic air-segmented continuous flow system implemented. Test transferred from RMSICL to ROM workstation. HP9820 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 10 to 7.

23/05/86 -Second instrument set up to analyse chlorides over 50 mg/L and samples requiring only chloride analysis. Range is 200 mg/L with approximate absorbance of 0.8 at full scale level. Performance reports for this instrument follow.

CHLORIDE
QUALITY CONTROL DATA FROM 04/03/86 TO 30/12/86

Lab: Colourimetry

Analytical Range: 1 to 50.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	181	40.0	40.1	0.1	0.57
b :	181	10.0	10.0	0.0	0.21
a+b :	181	50.0	50.2	0.2	0.68
a-b :	181	30.0	30.1	0.1	0.53
c :	181	10.0	10.0	0.0	0.21
d :	181	2.5	2.5	0.0	0.21
c+d :	181	12.5	12.5	0.0	0.36
c-d :	181	7.5	7.5	0.0	0.20

s.d.(AB): Sw(within run): 0.37 S(between runs): 0.43 S/Sw: 1.15
s.d.(CD): Sw(within run): 0.14 S(between runs): 0.21 S/Sw: 1.48

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 to 52.2 for A+B
28.5 to 31.5 for A-B
10.3 to 14.7 for C+D
6.0 to 9.0 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	229	0.0 - 5.0	0.46	38.9
	73	5.0 - 10.0	0.55	7.5
	92	10.0 - 25.0	0.45	2.6
	74	25.0 - 50.0	0.84	2.4
	468	Overall	0.55	N/A

STANDARD DEVIATION (s.dupl): 0.46 W value: 0.2 T value: 1

OTHER CHECKS:

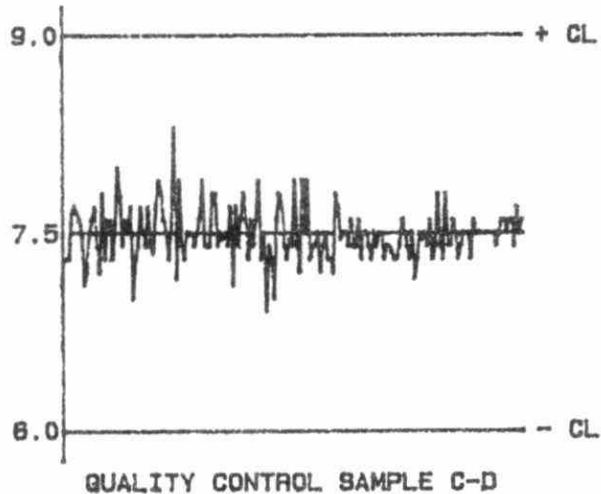
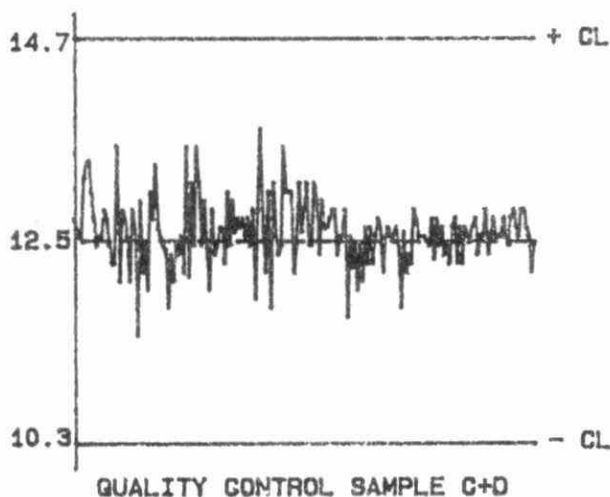
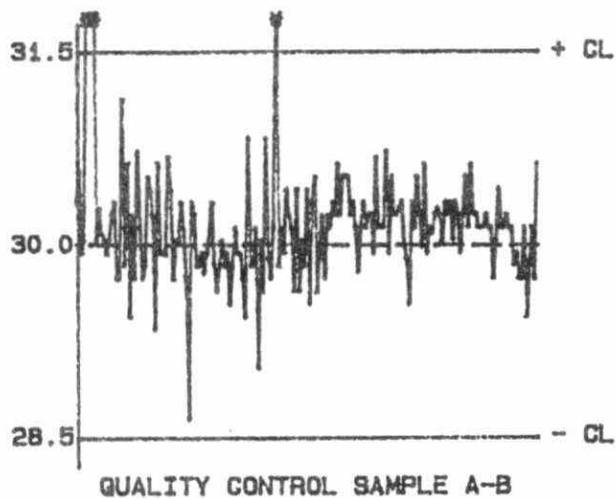
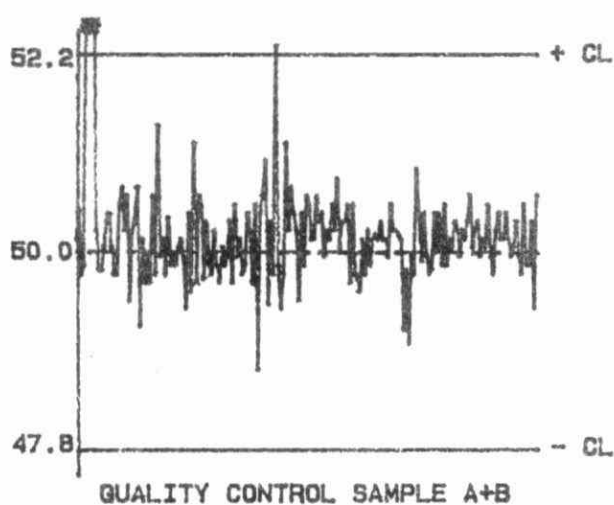
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	136	0.1	0.17

QUALITY CONTROL GRAPHS

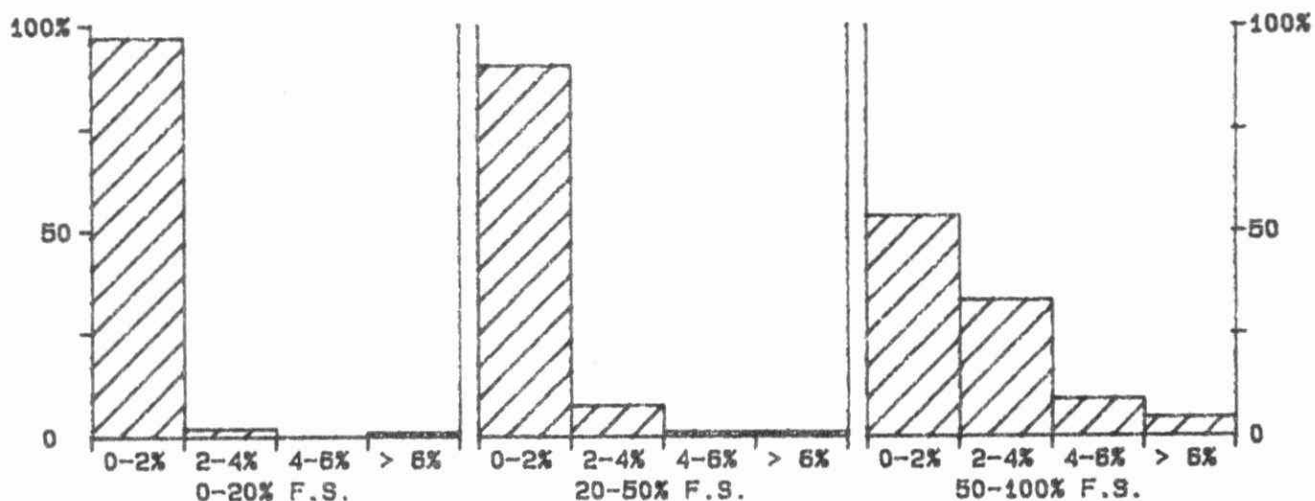
CHLORIDE (MG/L AS CL)

FROM: 04/03/86

TO: 30/12/86



--- EXPECTED VALUE
 --- CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 50 MG/L AS CL

CHLORIDE
QUALITY CONTROL DATA FROM 23/05/86 TO 02/09/86

Lab: Colourimetry

Analytical Range: 1 to 200.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	63	40.00	40.13	0.13	0.478
b :	63	10.00	10.10	0.10	0.250
a+b :	63	50.00	50.22	0.22	0.572
a-b :	63	30.00	30.03	0.03	0.504
c :	63	10.00	10.10	0.10	0.250
d :	63	2.50	2.57	0.07	0.241
c+d :	63	12.50	12.67	0.17	0.425
c-d :	63	7.50	7.52	0.02	0.247

s.d.(AB): Sw(within run): 0.356 S(between runs): 0.381 S/Sw: 1.07
s.d.(CD): Sw(within run): 0.175 S(between runs): 0.246 S/Sw: 1.41

On any given day the calibration is accepted if the values obtained lie within the ranges:

41.00 to 59.00 for A+B
24.00 to 36.00 for A-B
10.63 to 14.37 for C+D
6.25 to 8.75 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	91	0.0 - 20.0	0.39	4.5
	41	20.0 - 50.0	0.44	1.4
	25	50.0 - 100.0	0.71	0.9
	14	100.0 - 200.0	1.11	0.8
	171	Overall	0.55	N/A

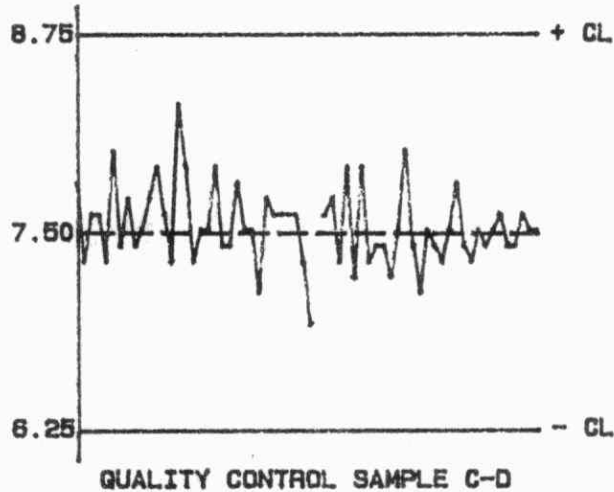
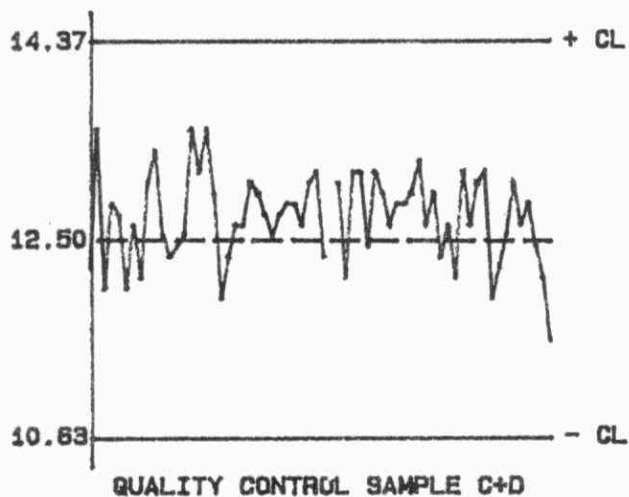
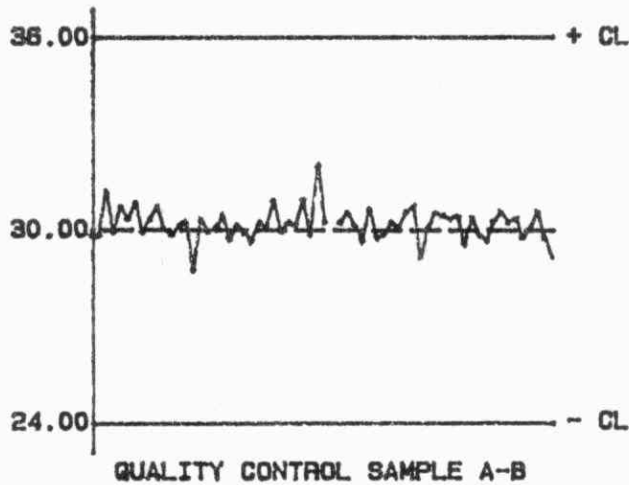
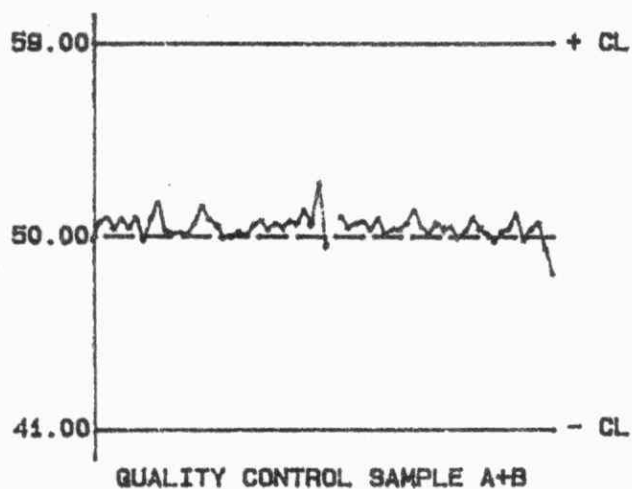
STANDARD DEVIATION (s.dupl): 0.39 W value: 0.2 T value: 1

OTHER CHECKS:

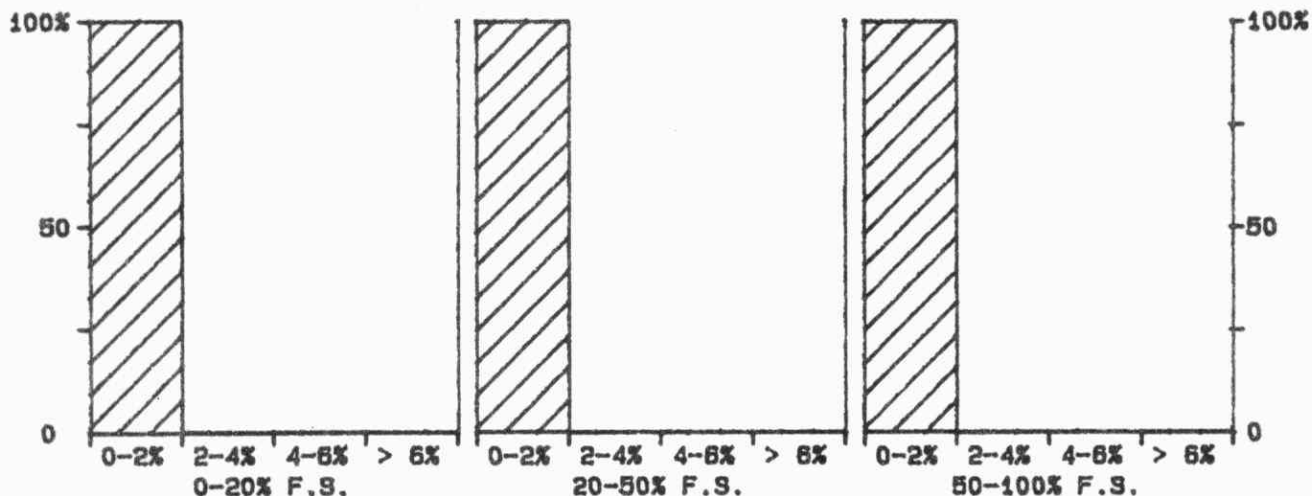
	Number of Data	Data Mean	Standard (1) Deviation
Long Term Blank :	1	0.0	N/A

QUALITY CONTROL GRAPHS CHLORIDE (MG/L AS CL)

FROM: 23/05/86
TO: 02/09/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CL

CHLORIDE
QUALITY CONTROL DATA FROM 05/09/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 1 to 200.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	51	160.00	160.26	0.26	1.218
b :	51	20.00	20.49	0.49	0.667
a+b :	51	180.00	180.75	0.75	1.387
a-b :	51	140.00	139.77	-0.23	1.390
c :	51	20.0	20.5	0.5	0.67
d :	51	2.5	2.8	0.3	0.54
c+d :	51	22.5	23.2	0.7	1.14
c-d :	51	17.5	17.7	0.2	0.43

s.d.(AB): Sw(within run): 0.983 S(between runs): 0.982 S/Sw: 1.00
s.d.(CD): Sw(within run): 0.30 S(between runs): 0.61 S/Sw: 2.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

171.0 to 189.0 for A+B
134.0 to 146.0 for A-B
13.5 to 31.5 for C+D
11.5 to 23.5 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	94	0.0 - 20.0	0.38	4.7
	29	20.0 - 50.0	0.88	2.9
	17	50.0 - 100.0	0.87	1.3
	4	100.0 - 200.0	1.66	1.2
	144	Overall	0.67	N/A

STANDARD DEVIATION (s.dup1): 0.38 W value: 0.2 T value: 1

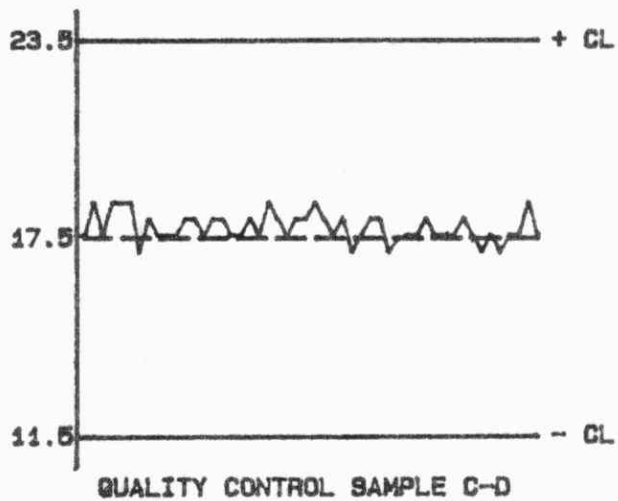
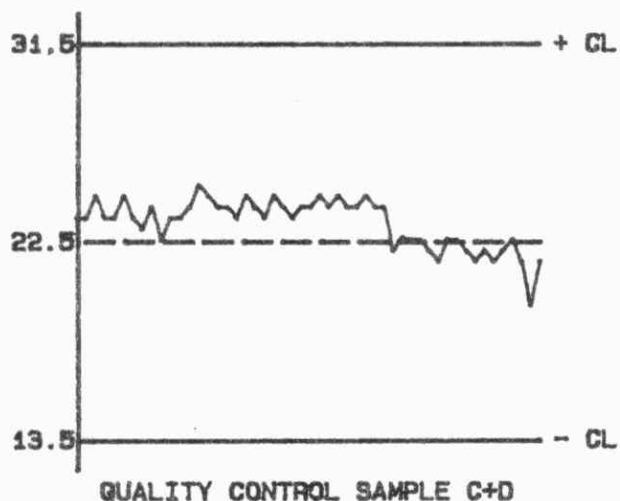
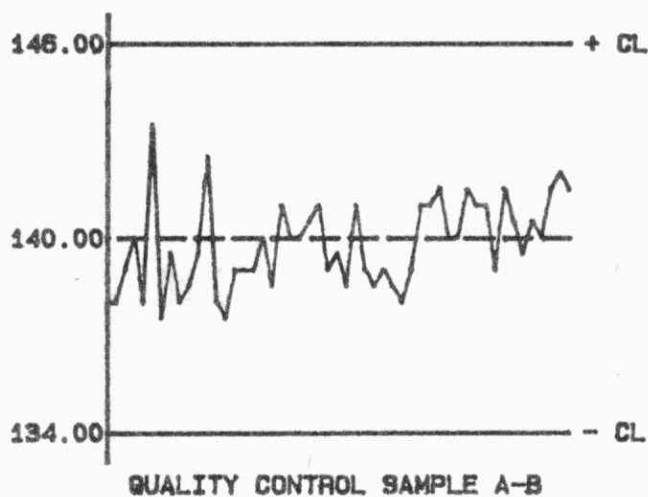
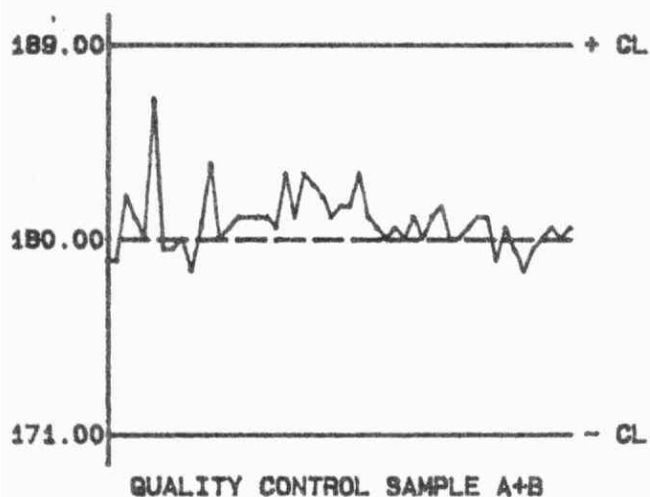
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	51	0.0	0.00

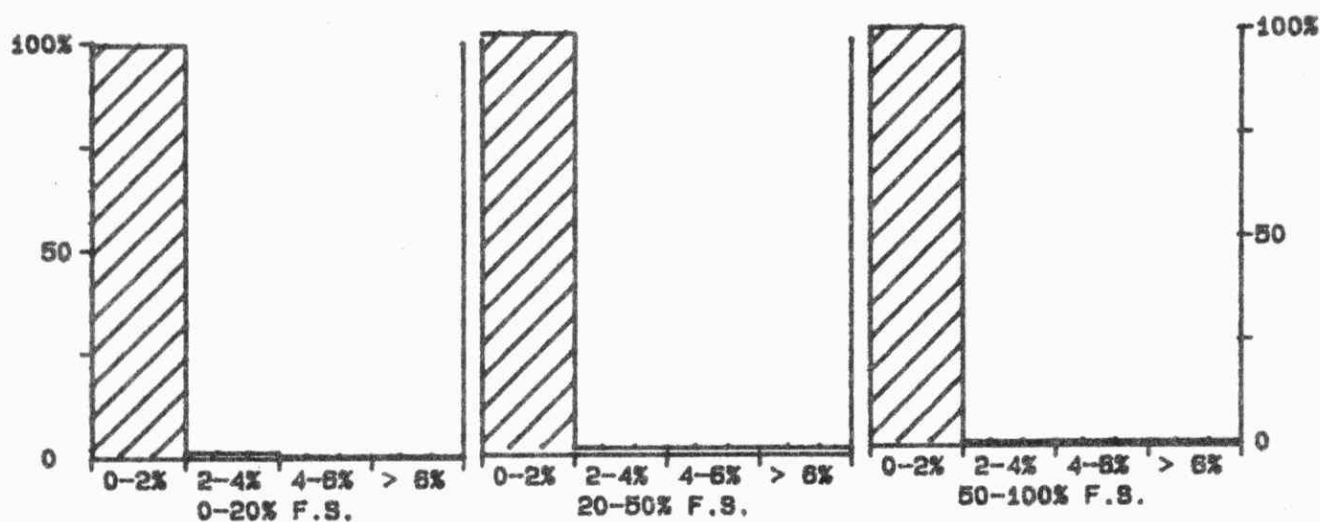
QUALITY CONTROL GRAPHS

CHLORIDE (MG/L AS CL)

FROM: 05/09/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS CL

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Rivers and Lakes	Method Introduced:	01/05/75
LIS Test Name Code:	CLIDUR	Units	: mg/L as Cl
Work Station Code	: RMSICL	Unit Code	: 064817
Method Code	: 004AC2	Supervisor	: J. Crowther
Sample Type/Matrix: Rivers, Lakes, Soil Extracts, Effluents.			

SAMPLING:

Quantity Required: 50 ml
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically. A reference stream, from which mercuric thiocyanate has been eliminated, is utilized to compensate for sample matrix effects. Approximate absorbance: 0.3 at the full scale level. N.B. Reactive silicates are determined simultaneously.

INSTRUMENTATION:

Boxed-FIA system consisting of basic automated modular continuous flow system plus the following modules: sample injection valves with air-flow controls, timer, bubble-gate. Colourimetric measurement is through a 1.5 cm light path at 470nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 4 standard

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10, and concentrations of QC standards were adjusted. The analytical rate was tripled.

NOTES:

04/03/86 -DISCONTIUED.
TEST TRANSFERRED TO ROM WORKSTATION.

CHLORIDE
QUALITY CONTROL DATA FROM 08/01/86 TO 26/02/86

Lab: Rivers and Lakes

Analytical Range: 0.25 to 50.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	30.0	30.0	0.0	0.41
b :	8	8.0	7.9	-0.1	0.16
a+b :	8	38.0	37.9	-0.1	0.51
a-b :	8	22.0	22.1	0.1	0.35
c :	8	8.00	7.96	-0.04	0.113
d :	8	2.00	2.04	0.04	0.085
c+d :	8	10.00	10.00	-0.00	0.193
c-d :	8	6.00	5.92	-0.08	0.052

s.d.(AB): Sw(within run): 0.25 S(between runs): 0.31 S/Sw: 1.26
s.d.(CD): Sw(within run): 0.037 S(between runs): 0.100 S/Sw: 2.72

On any given day the calibration is accepted if the values obtained lie within the ranges:

35.8 to 40.2 for A+B
20.5 to 23.5 for A-B
9.55 to 10.45 for C+D
5.70 to 6.30 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	18	0.00 - 2.00	0.052	7.1
	4	2.00 - 5.00	0.147	4.1
	1	5.00 - 10.00	N/A	N/A
	4	10.0 - 25.0	0.29	1.6
	0	25.0 - 50.0	N/A	N/A
	27	Overall	0.14	N/A

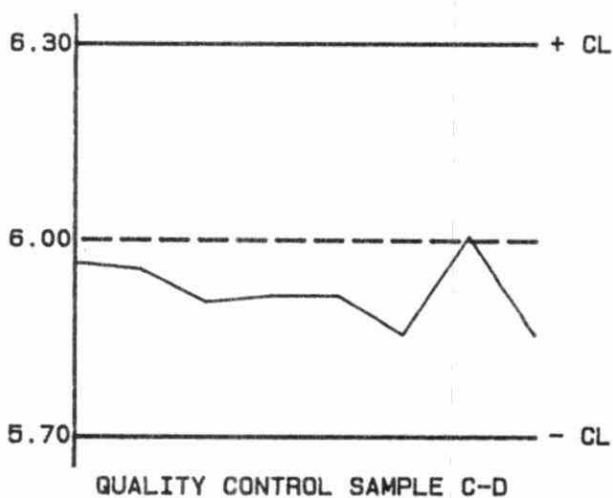
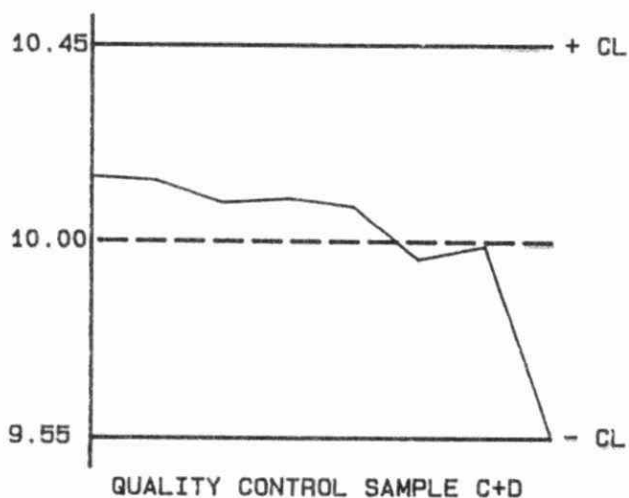
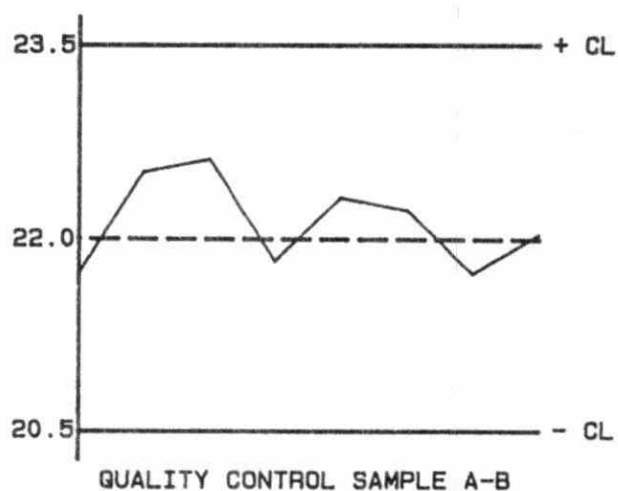
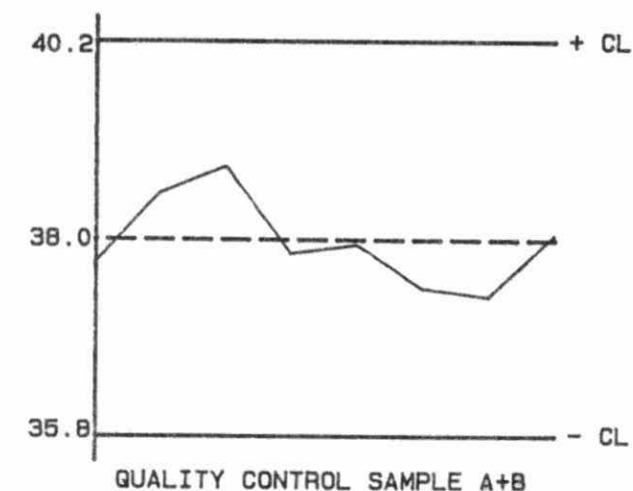
STANDARD DEVIATION (s.dup1): 0.052 W value: 0.05 T value: 0.25

OTHER CHECKS:

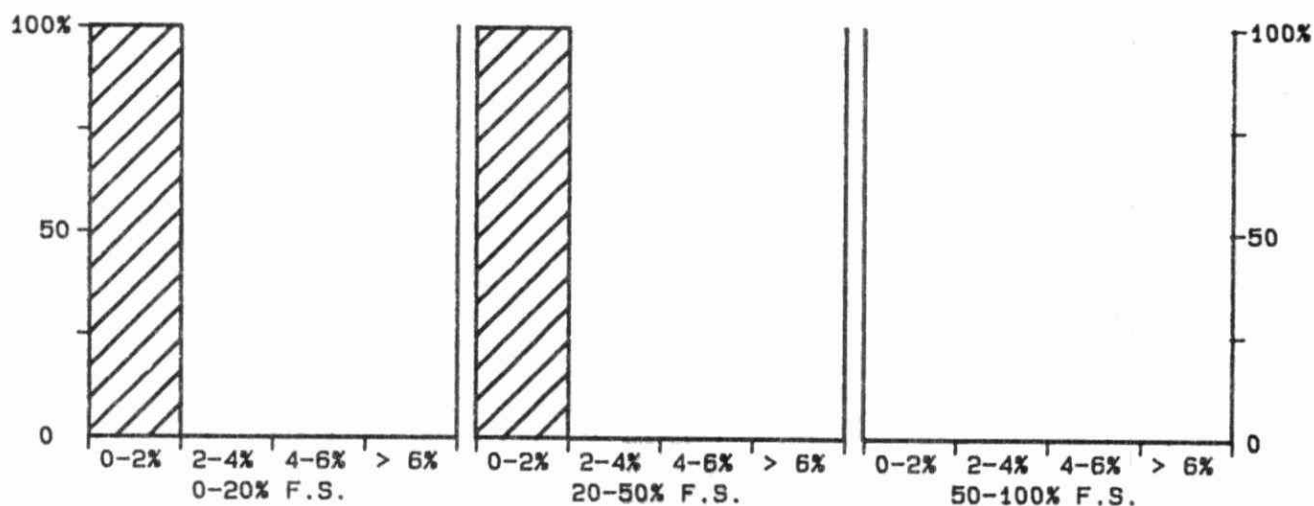
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	8	538	20.9
Long Term Blank :	8	0.00	0.000

QUALITY CONTROL GRAPHS CHLORIDE (MG/L AS CL)

FROM: 08/01/86
TO: 26/02/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** CHLORIDE ***

IDENTIFICATION:

Laboratory : Domestic Water Method Introduced: 01/06/66
LIS Test Name Code: CLIDUR Units : mg/L as Cl
Work Station Code : WCL Unit Code : 064817
Method Code : 002BT3 Supervisor : M. Rawlings
Sample Type/Matrix: Domestic Waters, Leachates, Sewage, Industrial Waste,
Effluents

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

An aliquot(10.0 mL) of sample is automatically pipetted and titrated with silver nitrate to an endpoint which is determined by calibration. The addition of silver nitrate to a sample containing chloride ions results in the precipitation of silver chloride with a corresponding change in voltage between the electrodes. The endpoint is equivalent to the maximum change in voltage per unit volume of titrant. A reagent containing acetone and nitric acid is utilized to prevent fouling of the electrodes by silver chloride precipitate.

INSTRUMENTATION:

Radiometer ATS-1 autopipetting titration system equipped with a silver-silver chloride electrode and a non-calomel reference electrode.

REPORTING:

Maximum Significant Figures: 4 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : Acid wash, BL, plus 1 standard

NOTES:

12/07/86 -DISCONTINUED.
TRANSFERRED TO ROM WORKSTATION.

CHLORIDE
QUALITY CONTROL DATA FROM 02/01/86 TO 27/02/86

Lab: Domestic Water

Analytical Range: 1 to 500.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	21	170.0	169.5	-0.5	1.68
b :	21	17.0	17.5	0.5	0.44
a+b :	21	187.0	187.0	0.0	1.75
a-b :	21	153.0	152.0	-1.0	1.72

s.d.(AB): SW(within run): 1.22 S(between runs): 1.23 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

172.0 to 202.0 for A+B
 143.0 to 163.0 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	50	0.0 - 50.0	0.26	2.1
	5	50.0 - 100.0	0.60	0.8
	0	100.0 - 250.0	N/A	N/A
	1	250.0 - 500.0	N/A	N/A
	56	Overall	0.31	N/A

STANDARD DEVIATION (s.dup1): 0.26

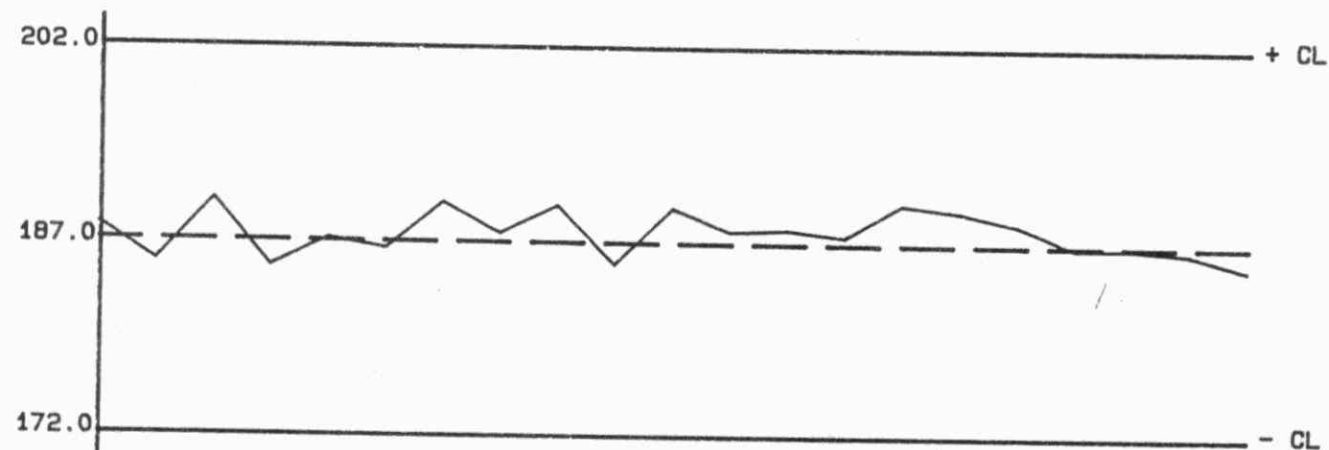
W value: 0.2

T value: 1

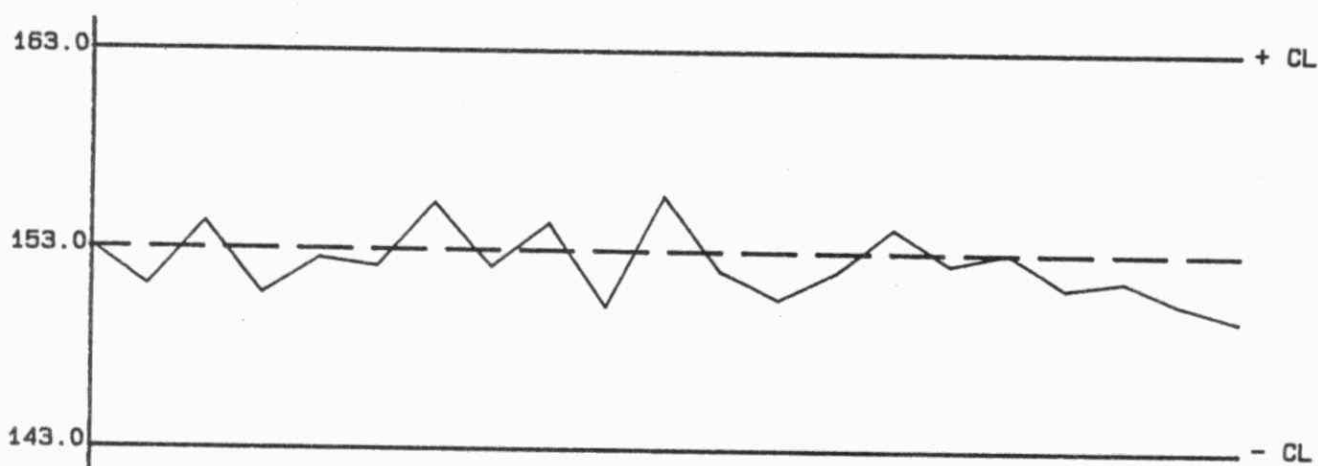
QUALITY CONTROL GRAPHS

CHLORIDE (MG/L AS CL)

FROM: 02/01/86
TO: 27/02/86

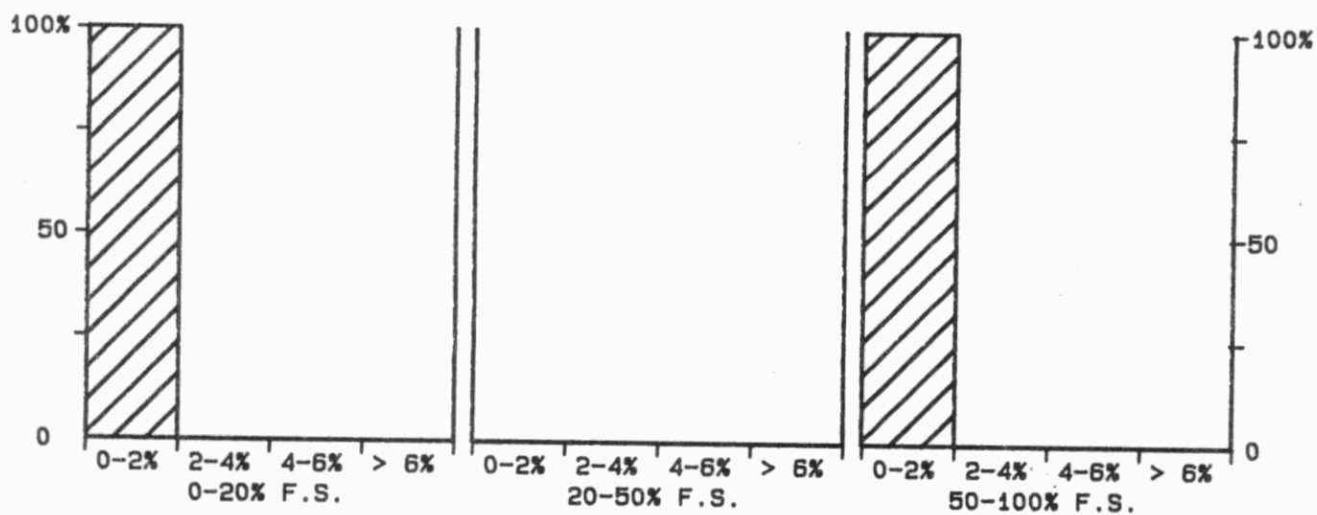


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 MG/L AS CL

*** CHLORIDE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/04/78
LIS Test Name Code: CLIDUR Units : mg/L as Cl
Work Station Code : PRIC1 Unit Code : 064817
Method Code : 005A10 Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow

SAMPLING:

Quantity Required: 15 ml.
Container : Polystyrene bottle.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample scan to a series of standard scans.
Full scale conductivity : 10 uS/cm.
Nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards (eg) QCA
Drift : 1 standard every 10 samples.

MODIFICATIONS:

20/09/84 -Chloride range was changed from 1.50 mg/L full scale to 2.00 mg/L full scale.

12/04/85 -Chloride quality control standards were changed; QCA from 1.20 to 1.60 mg/L, QCB from 0.30 to 0.40 mg/L. First three months' data were omitted because they were not comparable with the later ones.

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.

CHLORIDE
QUALITY CONTROL DATA FROM 07/01/86 TO 29/12/86

Lab: Ion Chromatography

Analytical Range: 0.05 to 2.00 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	135	1.60	1.60	0.00	0.013
b :	135	0.40	0.40	0.00	0.009
a+b :	135	2.00	2.00	0.00	0.017
a-b :	135	1.20	1.20	-0.00	0.015

s.d.(AB): Sw(within run): 0.011 S(between runs): 0.011 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

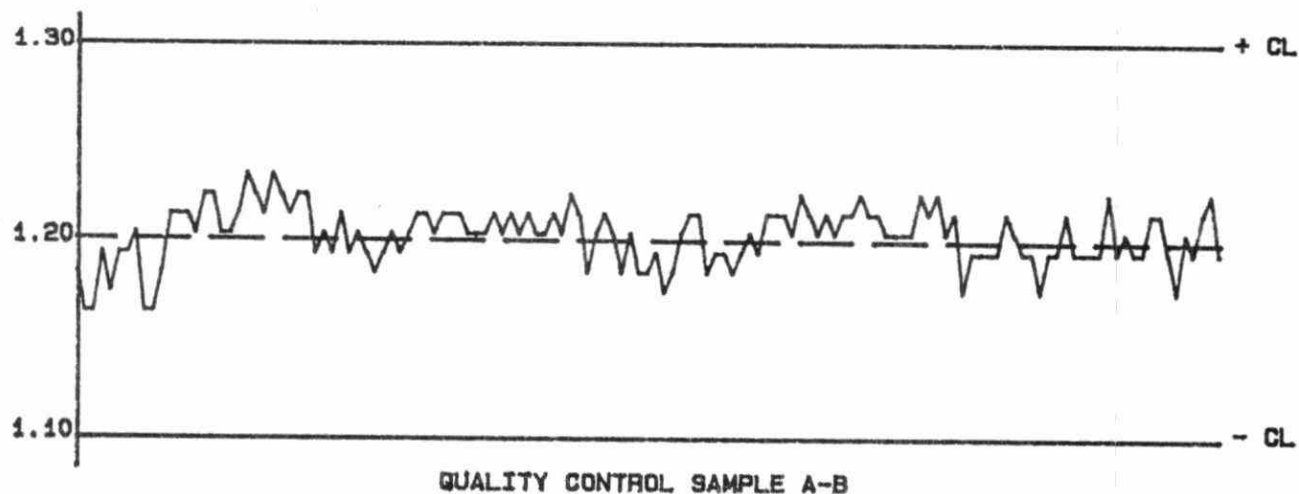
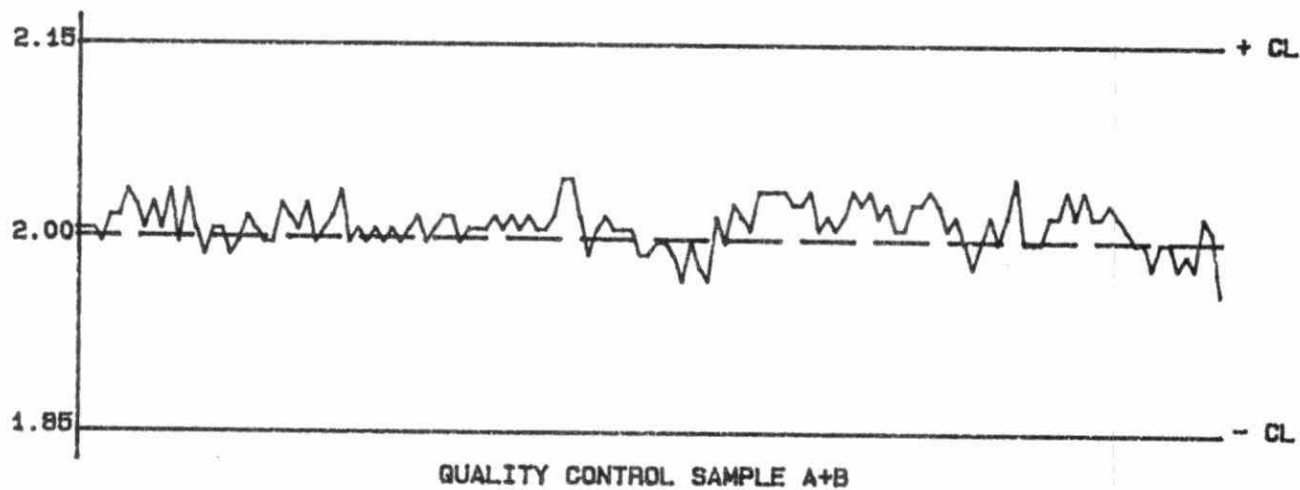
1.85 to 2.15 for A+B
 1.10 to 1.30 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	188	0.00 - 0.20	0.011	14.0
	43	0.20 - 0.50	0.019	6.4
	10	0.50 - 1.00	0.010	1.4
	2	1.00 - 2.00	0.011	0.7
	243	Overall	0.013	N/A

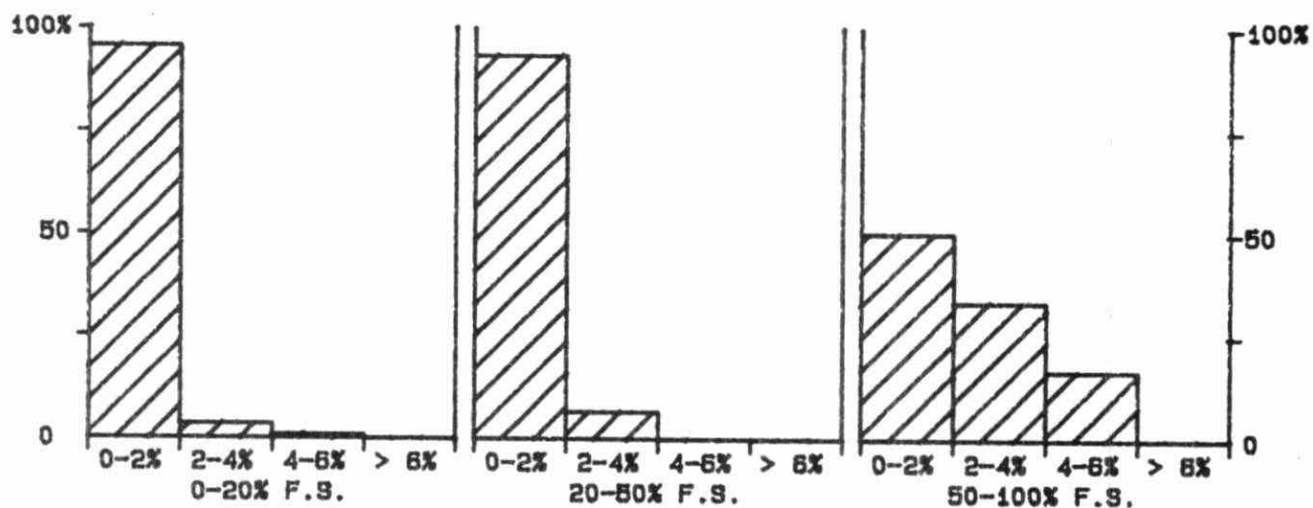
STANDARD DEVIATION (s.dup1): 0.011 W value: 0.01 T value: 0.05

QUALITY CONTROL GRAPHS CHLORIDE (MG/L AS CL)

FROM: 07/01/86
TO: 29/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS CL

*** CHLORIDE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/04/78
LIS Test Name Code: CLIDUR Units : ug/Filter as Cl
Work Station Code : PRLOV Unit Code : 361860
Method Code : 004AIC Supervisor : F. Tomassini
Sample Type/Matrix: W40 filters from LoVol filter packs.

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bag

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as Cl.

Full scale conductivity : 30 uS/cm.

Nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; polyethylene tubes
Automated modular continuous flow ion chromatographic system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.

20/08/84 -Chloride range was changed from 1.50 mg/L full scale to 2.00 mg/L full scale. Quality control standards were not changed.

12/04/85 -Chloride quality control standards were changed; QCA from 1.20 to 1.60 mg/L and QCB from 0.30 to 0.40 mg/L. First three months' data were omitted because they were not comparable with the later ones.

10/05/85 -Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

CHLORIDE
QUALITY CONTROL DATA FROM 14/01/86 TO 11/12/86

Lab: Ion Chromatography

Analytical Range: 5 to 100.0 ug/Filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	27	80.0	79.9	-0.1	0.78
b :	27	20.0	20.1	0.1	0.43
a+b :	27	100.0	100.0	0.0	0.85
a-b :	27	60.0	59.8	-0.2	0.94

s.d.(AB): Sw(within run): 0.66 S(between runs): 0.63 S/Sw: 0.95

On any given day the calibration is accepted if the values obtained lie within the ranges:

92.5 to 107.5 for A+B
 55.0 to 65.0 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	7	0.0 - 15.0	1.51	18.4
	5	15.0 - 37.5	0.63	3.0
	3	37.5 - 100.0	1.57	2.8
	15	Overall	1.30	N/A

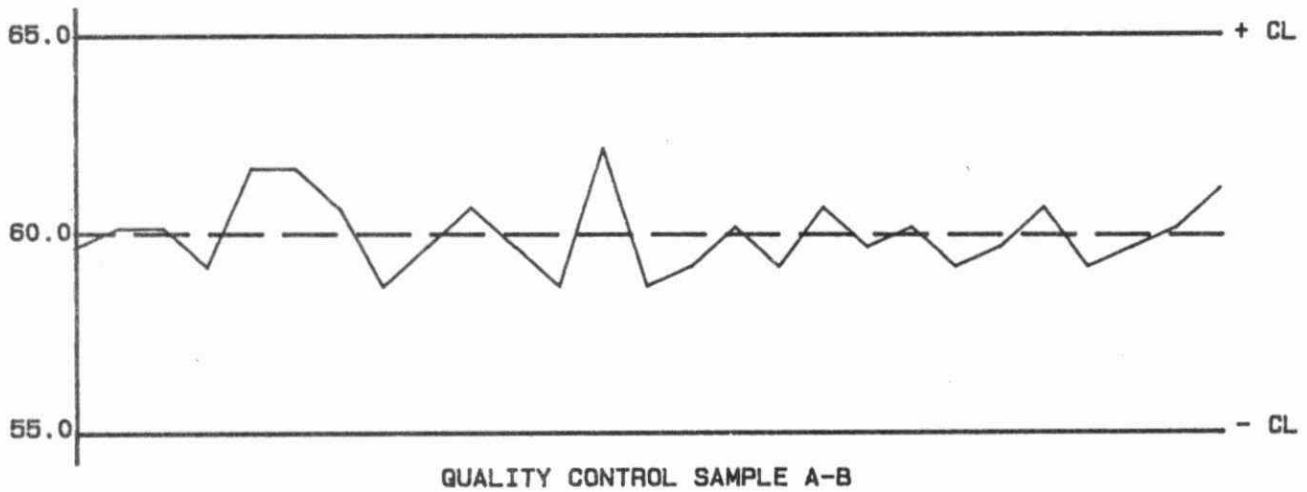
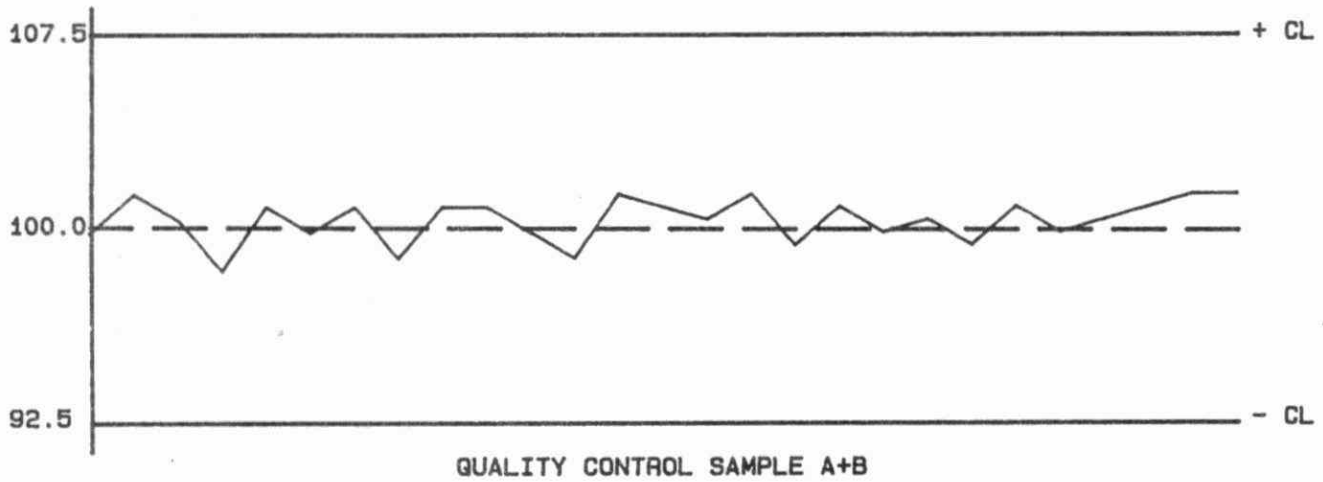
STANDARD DEVIATION (s.dupl): 1.51

W value: 1

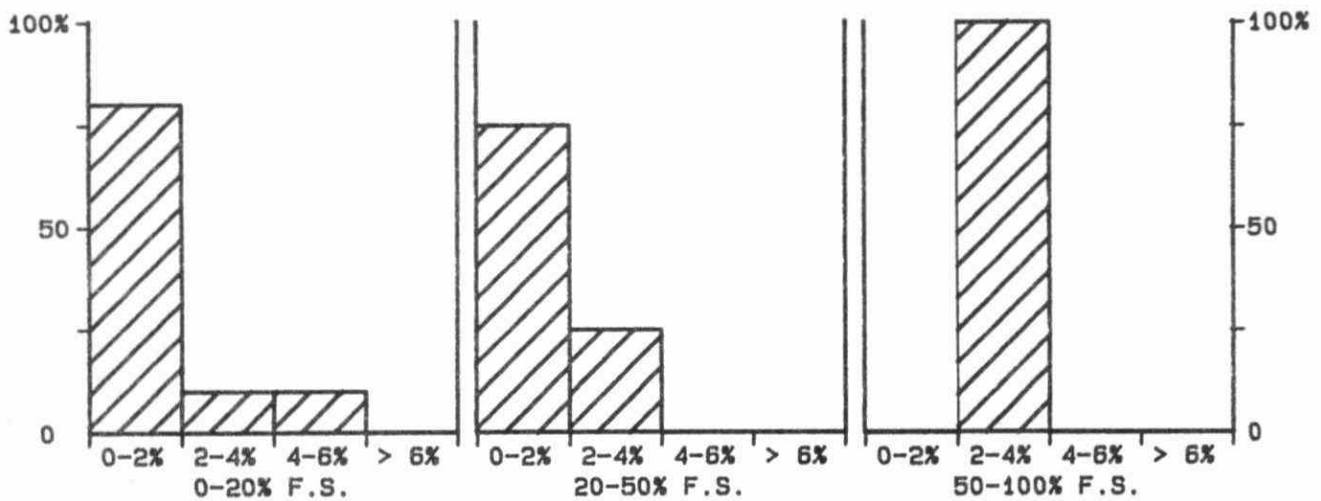
T value: 5

QUALITY CONTROL GRAPHS CHLORIDE (UG/FILTER AS CL)

FROM: 14/01/86
TO: 11/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/FILTER AS CL

*** CHLOROPHYLL ***

IDENTIFICATION:

Laboratory : Colourimetry Method Introduced: 01/04/75
LIS Test Name Code: CHLRAT,CHLRBT,CHLRAC Units : ug/L
Work Station Code : RCHLO Unit Code : 063000
Method Code : 002DS1 Supervisor : M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Effluents

SAMPLING:

Quantity Required: 1000 mL
Container : Glass
Other : In the field a sample is filtered through a nylon filter.
The filter is then placed between two membrane filter-
support pads, and the package is enclosed in a plastic dish.

SAMPLE PREPARATION:

If the sample has not been filtered in the field, a measured volume is filtered through a nylon filter under moderate suction. Upon addition of 8 mL acetone (90% V/V), the filter is agitated to release chlorophyll; an additional 4.0 mL acetone (90% V/V) is added and the mixture is rested overnight to improve extraction efficiency. The next morning, the sample is gently mixed for analysis.

ANALYTICAL PROCEDURE:

Using a Commodore PET microcomputer-controlled, automated spectrophotometer, two scans are developed with absorbance measurements at 630, 645, and 663 nm for the first scans; the minimum absorbance value between 710 and 750 nm (readings at 5 nm intervals) is utilized as a turbidity correction. Chlorophyll a and b are calculated from this scan. After automated acidification, the second scan is obtained from the wavelengths 630, 645, 665 nm for calculating chlorophyll a, corrected. SCOR-UNESCO equations are used for all chlorophyll calculations.

INSTRUMENTATION:

-Automated modular continuous flow scanning spectrophotometer system
-Microcomputer system for control of sampling, timing, and data processing (i.e. data capture, calculations, and transfer of results to LIS)

REPORTING:

Maximum Sig. Figures: 3 Calculated W values: 0.2,0.1,N/A T values: 1,0.5,N/A

CONTROLS:

Calibration : LTBL plus 2 "standards", eg, QCA
Drift : "standard", bl every 20 samples

MODIFICATIONS:

01/07/84 -Automated, microcomputer controlled system was introduced.
13/06/85 -Centrifuging steps were eliminated and nylon filters were introduced.

NOTES:

In 1982 calibration controls were stable, but were prepared from dyes rather than chlorophyll. "Standards" are now prepared from chlorophyll a and b, but the materials are neither analytical grade nor are their solutions stable. Thus calibration controls are based on measured averages.

21/11/86 -Test suspended, all subsequent analysis now being done through privatization.

CHLOROPHYLL - a
QUALITY CONTROL DATA FROM 08/01/86 TO 29/12/86

Lab: Colourimetry

Analytical Range: 1 to 10.00 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	109	3.06	2.94	-0.12	0.129
b :	109	1.02	1.01	-0.01	0.060
a+b :	109	4.08	3.95	-0.13	0.179
a-b :	109	2.04	1.93	-0.11	0.090

s.d.(AB): SW(within run): 0.064 S(between runs): 0.101 S/SW: 1.58

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.58 to 5.58 for A+B

1.04 to 3.04 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
53	0.00 - 2.00	0.263	20.3
38	2.00 - 5.00	0.511	17.1
18	5.00 - 10.00	0.999	13.9
109	Overall	0.538	N/A

STANDARD DEVIATION (s.dup1): 0.263

W value: 0.2

T value: 1

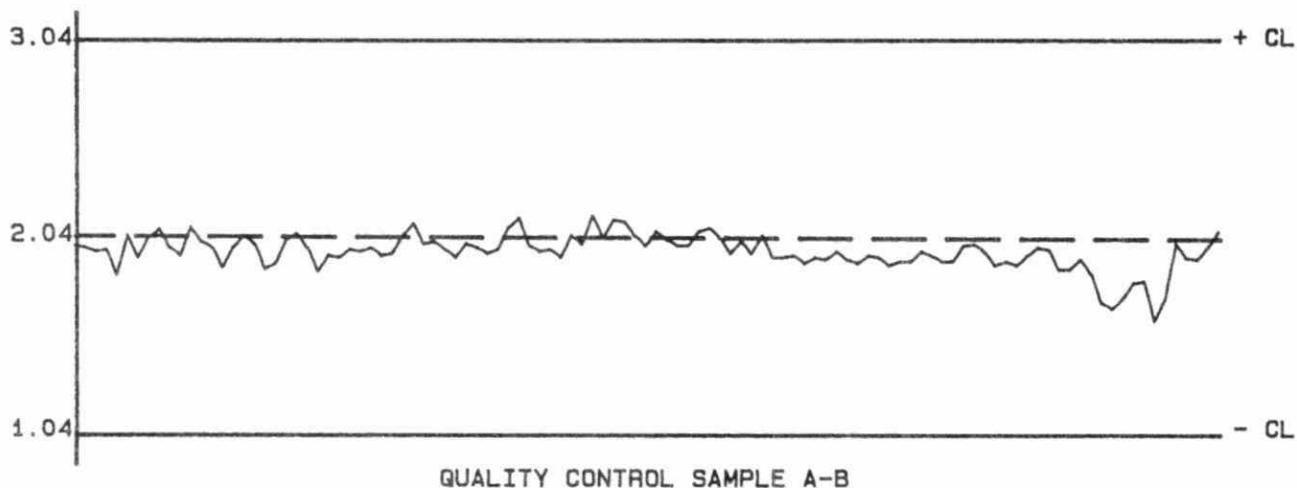
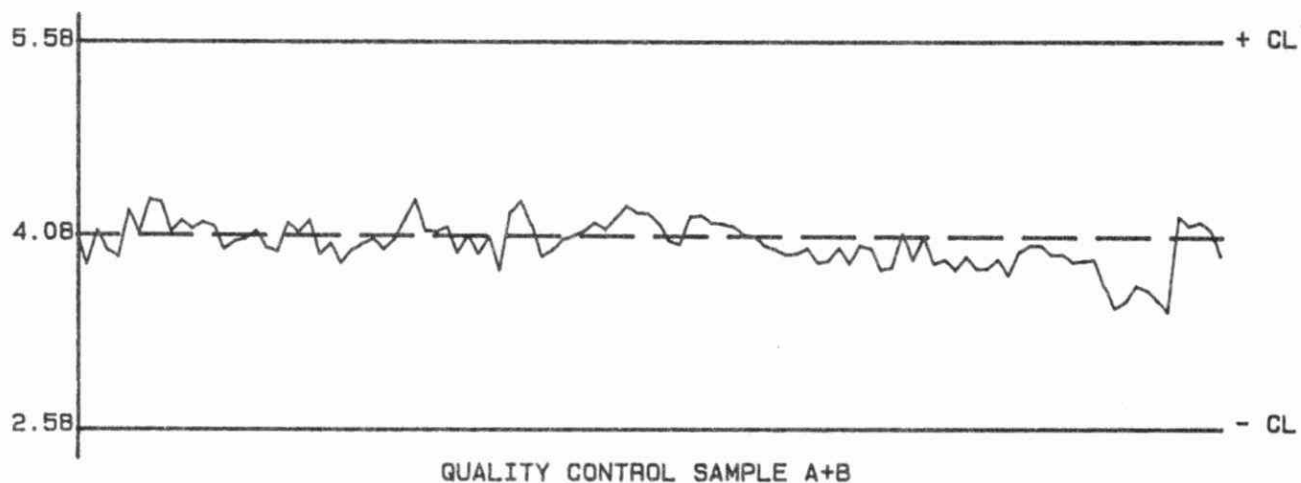
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	108	0.06	0.038
Digested Blank :	12	0.07	0.056

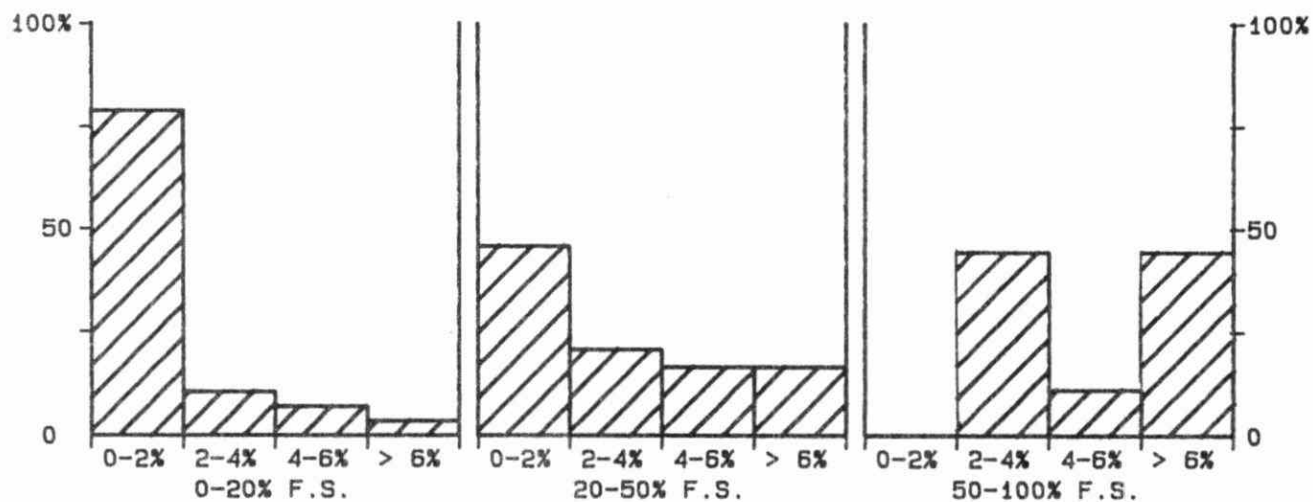
QUALITY CONTROL GRAPHS CHLOROPHYLL - A (UG/L)

FROM: 08/01/86

TO: 29/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 UG/L

CHLOROPHYLL-ACIDIFIED
QUALITY CONTROL DATA FROM 08/01/86 TO 29/12/86

Lab: Colourimetry

Analytical Range: N/A to 10.00 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	106	2.50	2.46	-0.04	0.286
b :	106	1.00	0.84	-0.16	0.179
a+b :	106	3.50	3.30	-0.20	0.392
a-b :	106	1.50	1.62	0.12	0.271

s.d.(AB): Sw(within run): 0.192 S(between runs): 0.239 S/Sw: 1.25

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.00 to 5.00 for A+B
0.50 to 2.50 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	1	0.00 - 3.00	N/A	N/A
	0	3.00 - 5.00	N/A	N/A
	4	5.00 - 10.00	1.159	18.6
	5	Overall	1.039	N/A

STANDARD DEVIATION (s.dupl): N/A W value: N/A T value: N/A

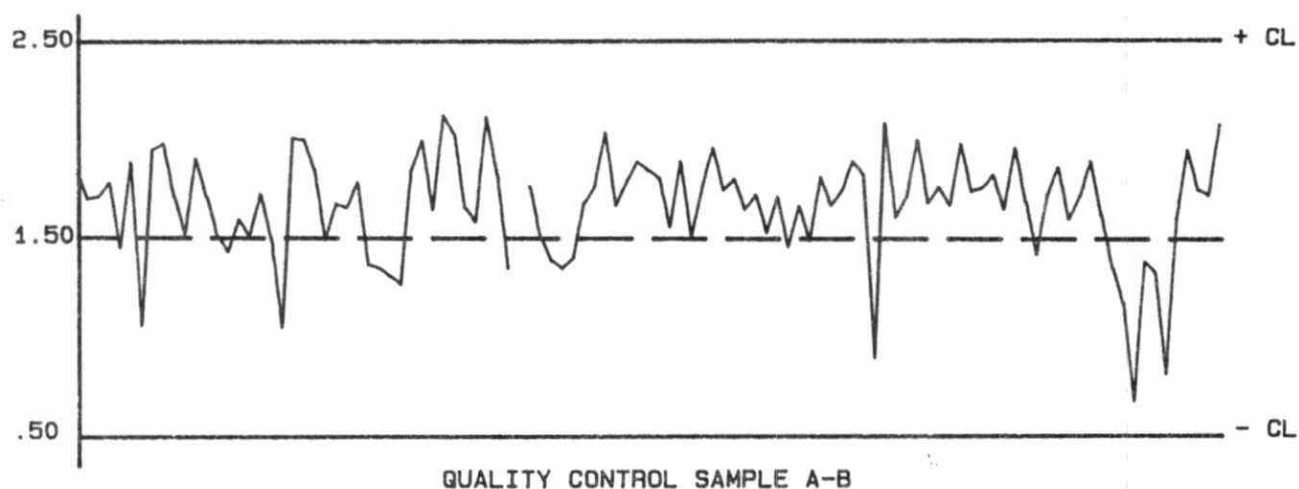
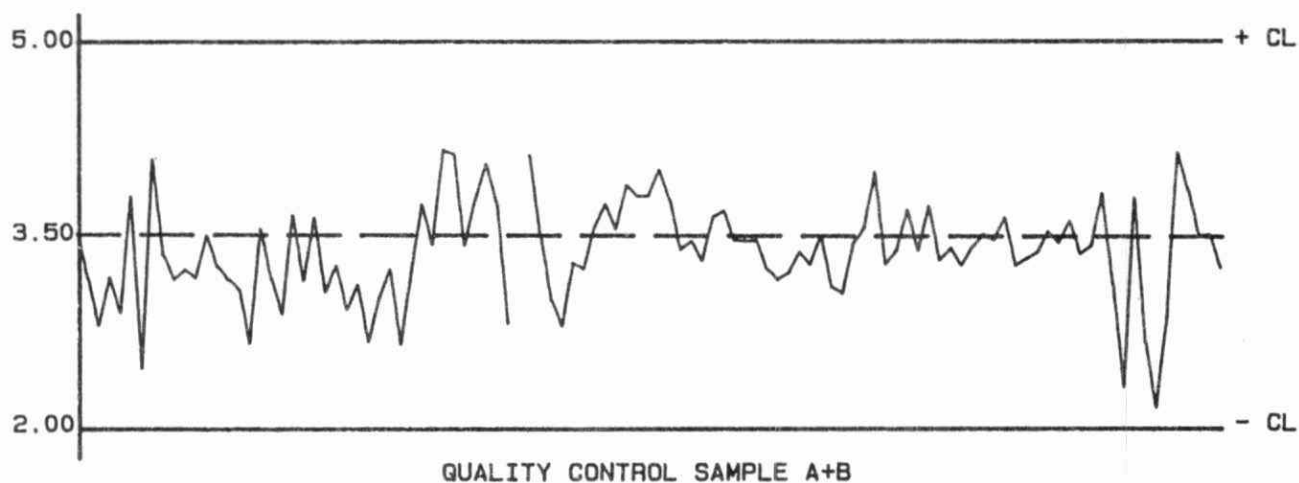
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	104	-0.00	0.137
Digested Blank :	11	-0.07	0.206

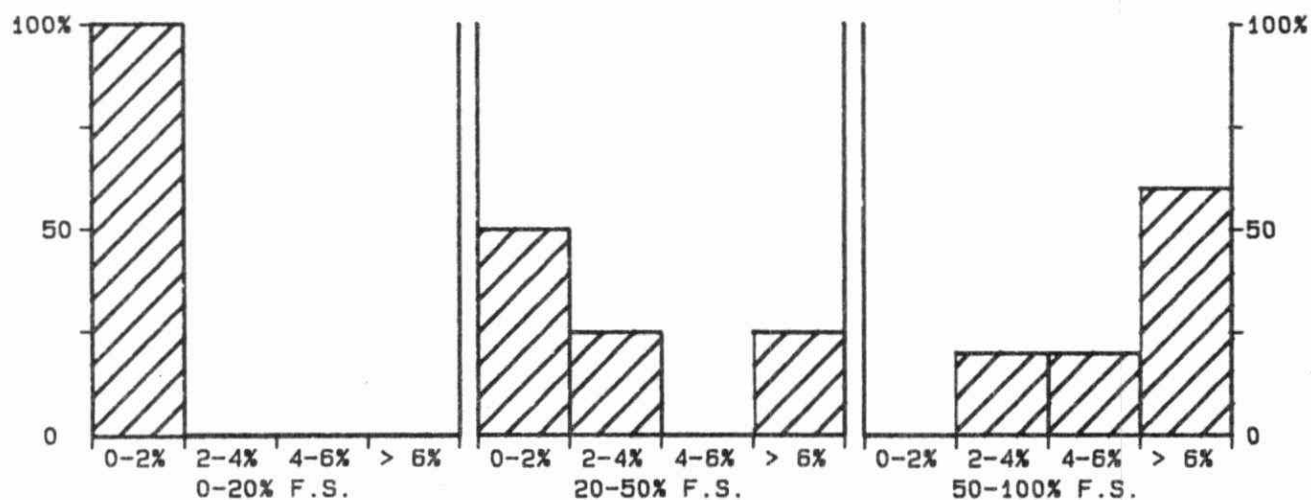
QUALITY CONTROL GRAPHS CHLOROPHYLL-ACIDIFIED (UG/L)

FROM: 08/01/86

TO: 29/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 UG/L

CHLOROPHYLL - b
QUALITY CONTROL DATA FROM 08/01/86 TO 29/12/86

Lab: Colourimetry

Analytical Range: 0.5 to 10.00 ug/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	108	3.06	3.10	0.04	0.110
b :	108	1.02	1.07	0.05	0.074
a+b :	108	4.08	4.17	0.09	0.164
a-b :	108	2.04	2.02	-0.02	0.091

s.d.(AB): SW(within run): 0.064 S(between runs): 0.094 S/Sw: 1.46

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.33 to 4.83 for A+B
 1.54 to 2.54 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	109	0.00 - 2.00	0.109	17.9
	3	2.00 - 5.00	0.568	19.6
	2	5.00 - 10.00	0.078	1.2
	114	Overall	0.141	N/A

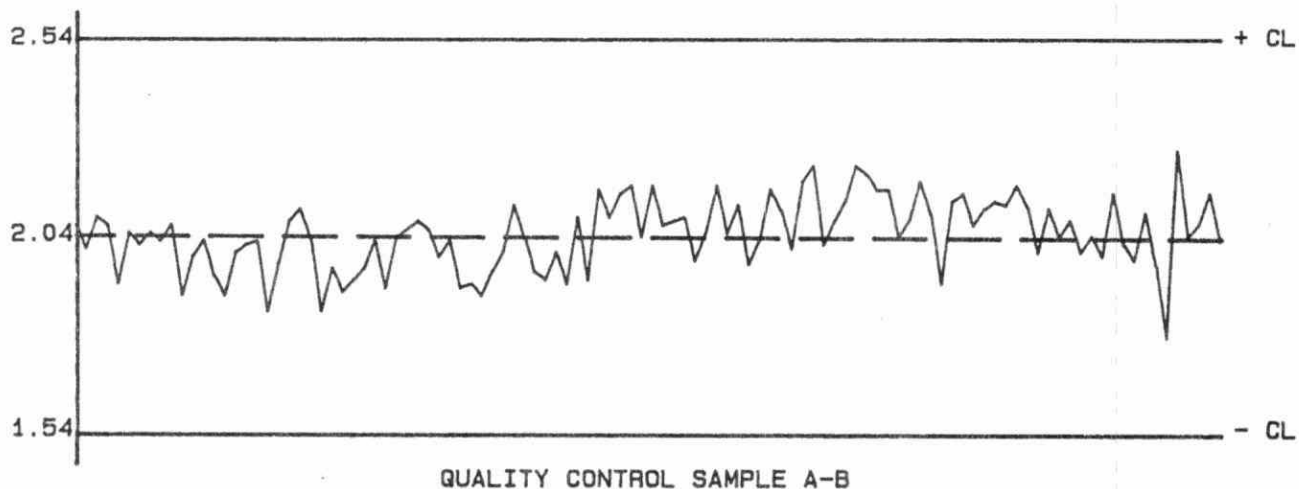
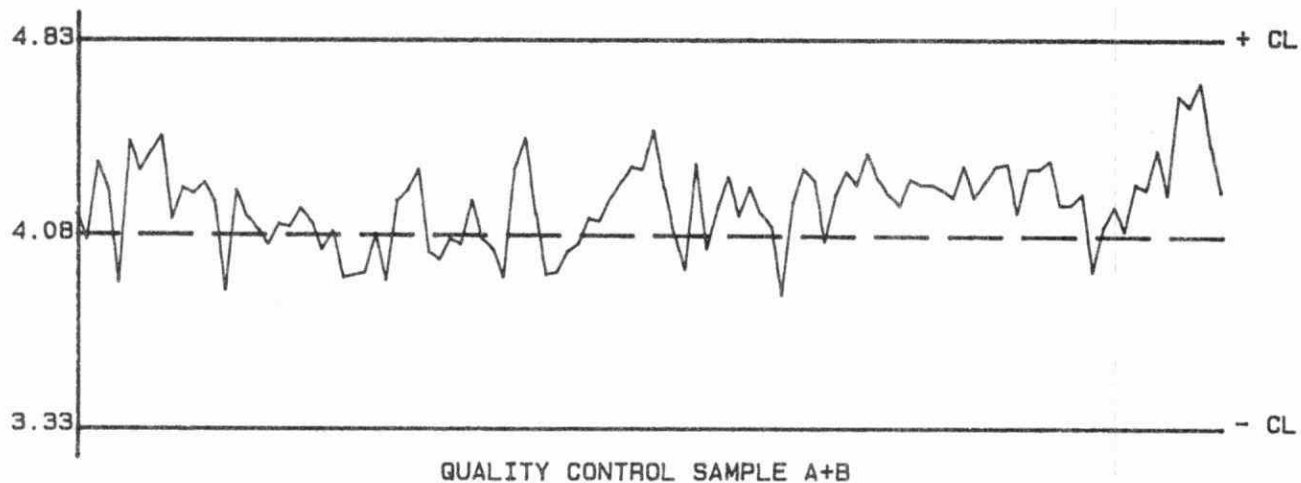
STANDARD DEVIATION (s.dupl): 0.109 W value: 0.1 T value: 0.5

OTHER CHECKS:

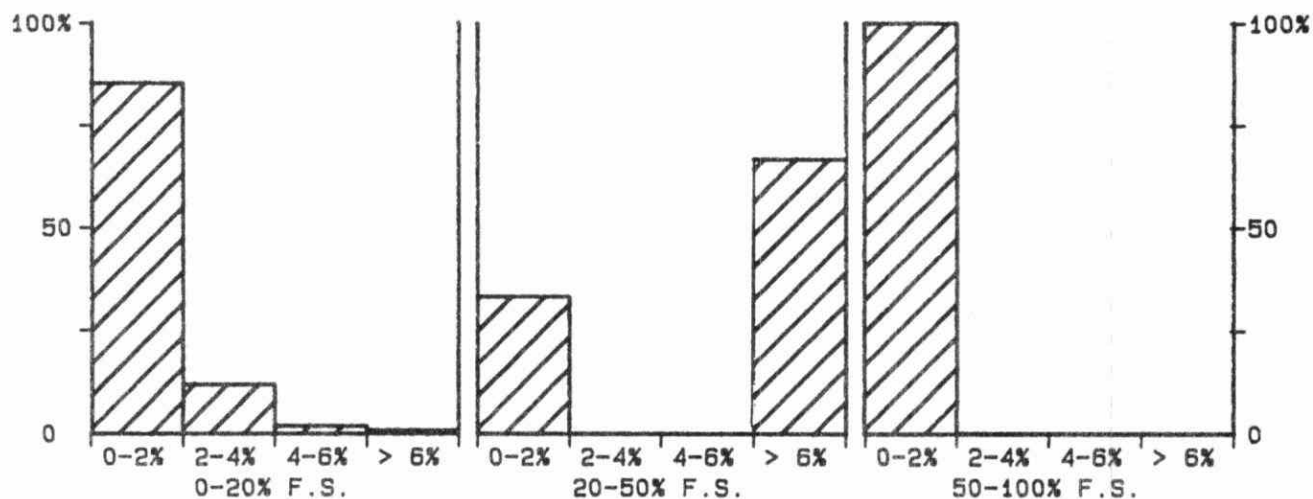
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	108	0.08	0.077
Digested Blank :	11	0.11	0.094

QUALITY CONTROL GRAPHS CHLOROPHYLL - B (UG/L)

FROM: 08/01/86
TO: 29/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 UG/L

*** CLAY ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	CLAY	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 20 g dry (<2 mm).
Container : glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (> 53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of clay in the sample is based on the settling velocities of sperical particles by the application of Stokes Law.

INSTRUMENTATION:

Sartorius 4 place digital balance (model 1201)
Balance accurate to 0.0001 g.

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus
a round robin CSSC sample

NOTES:

Two recovery soils are alternated between batches, using their mean values.

CLAY
QUALITY CONTROL DATA FROM 02/05/86 TO 20/06/86

Lab: Dorset Soils

Analytical Range: 5 to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	17	57	56	2.6
r2 :	10	8.0	8.4	1.43

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	21	0 - 20	1.3	14.6
	3	20 - 50	1.4	4.0
	0	50 - 100	N/A	N/A
	24	Overall	1.3	N/A

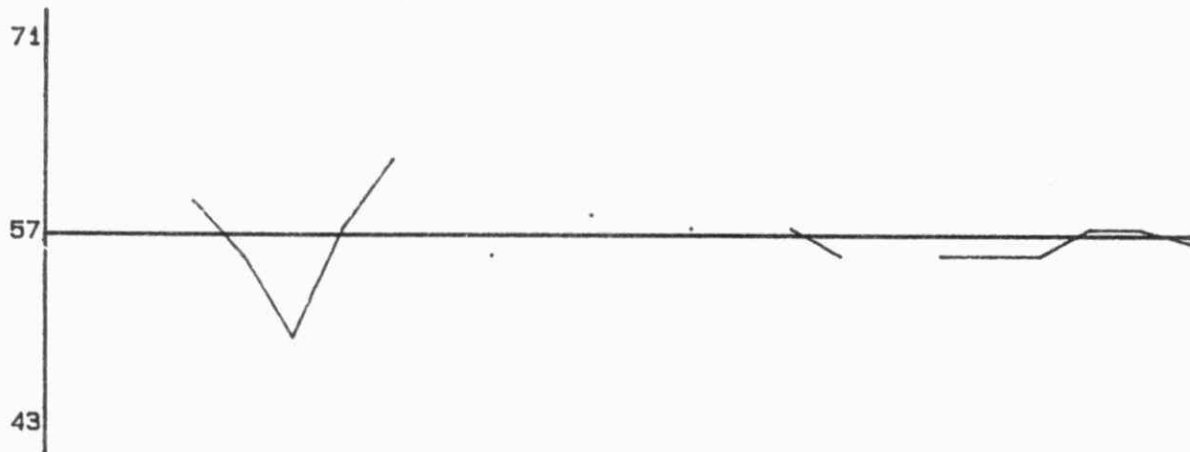
STANDARD DEVIATION (s.dupl): 1.3

W value: 1

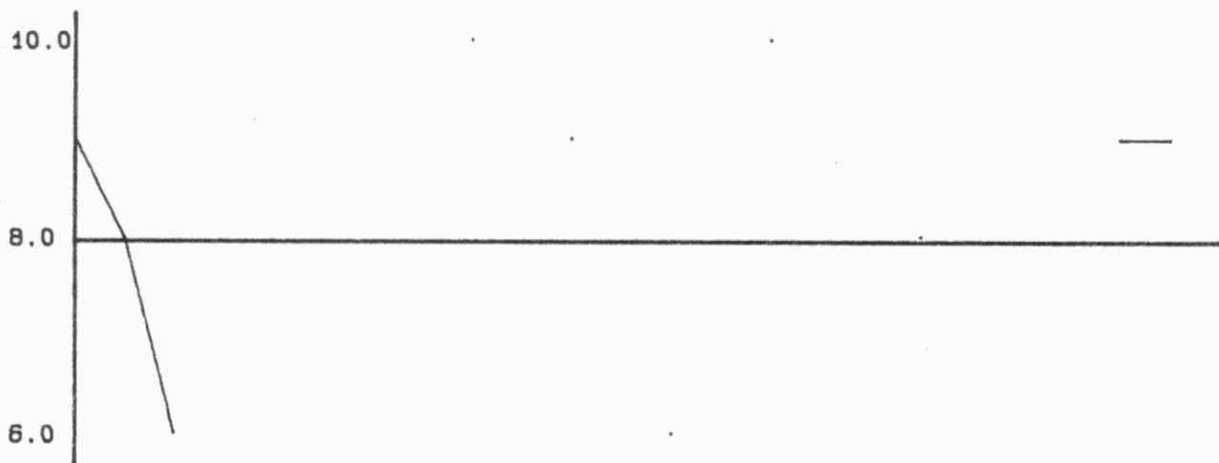
T value: 5

QUALITY CONTROL GRAPHS CLAY (% BY WT.)

FROM: 02/05/86
TO: 20/06/86

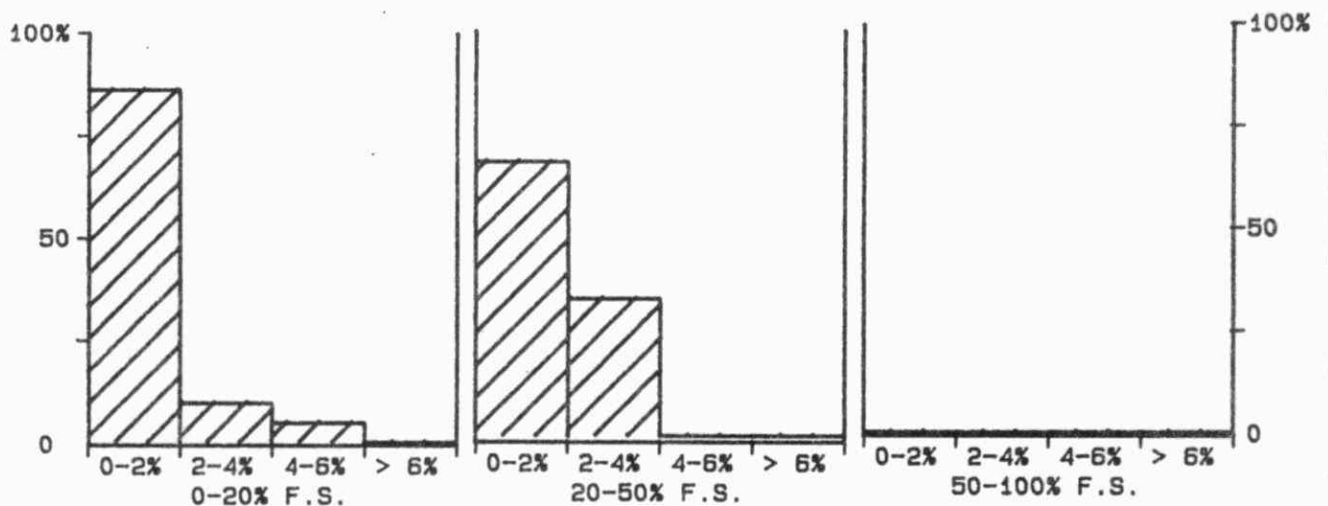


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

*** COLOUR - TRUE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	13/03/84
LIS Test Name Code:	COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Sample Type/Matrix:	Domestic Waters, Effluents		

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.

Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Basic automated modular continuous flow system. Colour measurement is through a 3.0 cm. light path using a broadband filter (400-450nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740nm).

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; standard every 20 samples

NOTES:

New procedure was initiated to conform with change in "Ontario Drinking Water Objectives"; copy of research study is available on request.

COLOUR-TRUE
QUALITY CONTROL DATA FROM 09/01/86 TO 31/12/86

Lab: Colourimetry

Analytical Range: 2.5 to 100.0 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	90	50.0	51.7	1.7	1.23
b :	90	25.0	25.9	0.9	0.62
a+b :	90	75.0	77.6	2.6	1.70
a-b :	90	25.0	25.9	0.9	0.95
c :	90	25.0	25.9	0.9	0.63
d :	89	5.0	4.6	-0.4	0.44
c+d :	89	30.0	30.5	0.5	0.87
c-d :	89	20.0	21.2	1.2	0.62

s.d.(AB): Sw(within run): 0.67 S(between runs): 0.97 S/Sw: 1.45
s.d.(CD): Sw(within run): 0.44 S(between runs): 0.54 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

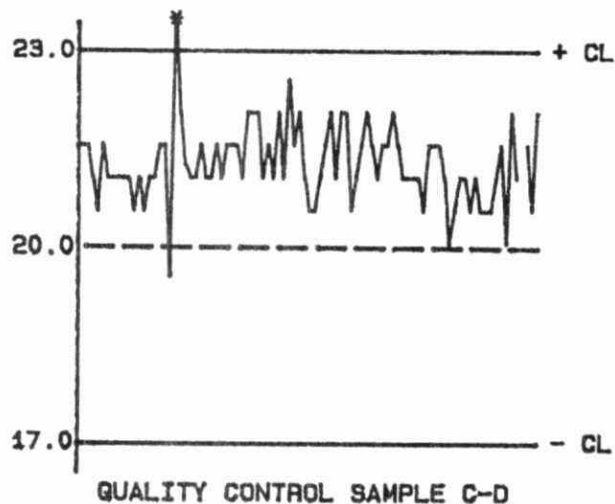
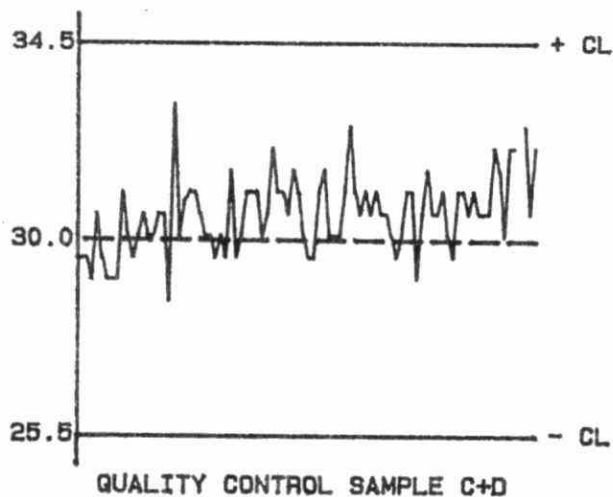
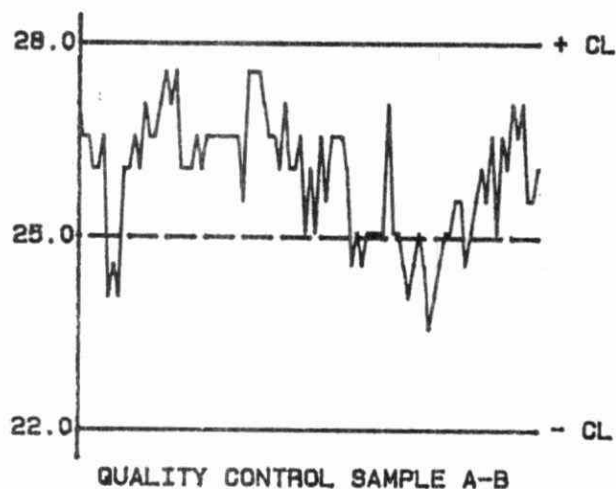
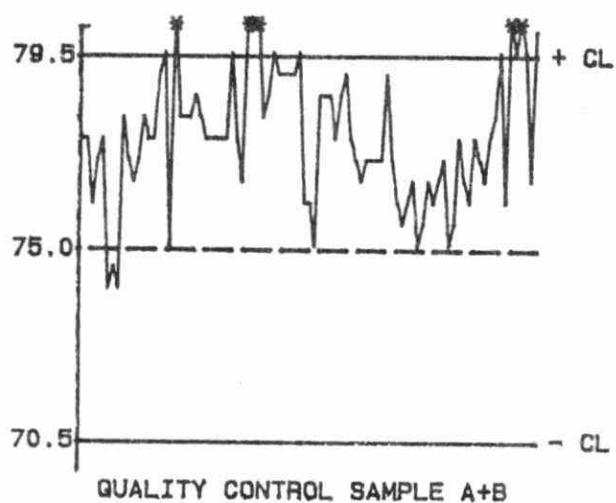
70.5 to 79.5 for A+B
22.0 to 28.0 for A-B
25.5 to 34.5 for C+D
17.0 to 23.0 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	67	0.0 - 5.0	0.63	27.5
	40	5.0 - 10.0	0.61	7.8
	91	10.0 - 25.0	0.72	4.3
	25	25.0 - 50.0	0.94	2.7
	18	50.0 - 100.0	1.44	2.2
	241	Overall	0.78	N/A

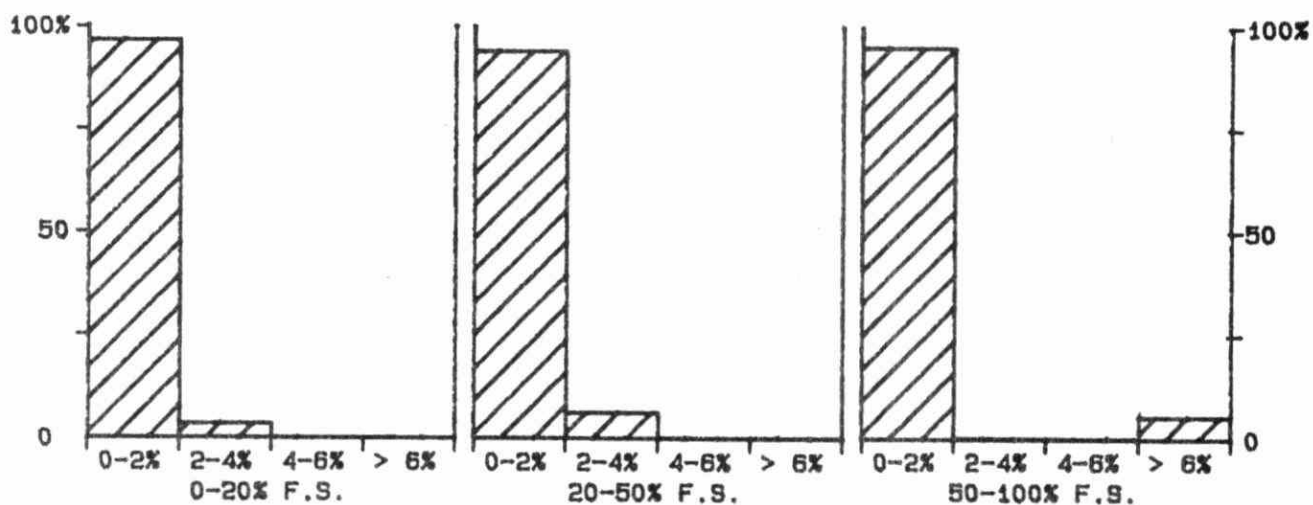
STANDARD DEVIATION (s.dup1): 0.63 W value: 0.5 T value: 2.5

QUALITY CONTROL GRAPHS COLOUR-TRUE (TCU)

FROM: 09/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** COLOUR - TRUE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	15/10/80
LIS Test Name Code:	COLTR	Units	: Hazen Units
Work Station Code	: DOCC	Unit Code	: 341000
Method Code	: 1102KP	Supervisor	: F. Tomassini
Sample Type/Matrix:	Streams, Lakes		

SAMPLING:

Quantity Required: 75 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

True colour is measured on a settled sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a broadband blue filter. Turbidity effects are partially suppressed by using a broadband red filter. True colour is calculated from the two absorbance measurements using an empirically derived equation.
Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

Two colourimeters, one with broadband blue filter(400-450nm) and the other with broadband red filter(660-740nm). Colourimetric measurement is through a 4.0 cm light path.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1** T value: 5

CALIBRATION:

BL plus 1 standard

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA

NOTES:

Slope factor is changed whenever light source in a colourimeter is replaced. This is accomplished by analyzing 7 standards.

COLOUR - TRUE
QUALITY CONTROL DATA FROM 07/01/86 TO 18/12/86

Lab: Dorset

Analytical Range: 5 to 100 HZV

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	173	50	50	0	0.9
b :	173	10	10	0	0.5
a+b :	173	60	60	0	1.1
a-b :	173	40	40	0	1.0

s.d.(AB): Sw(within run): 0.7 S(between runs): 0.7 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

53 to 67 for A+B
35 to 45 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
101	0 - 10	0.6	10.1
98	10 - 25	1.3	7.6
108	25 - 50	1.0	2.5
77	50 - 100	1.7	2.3
384	Overall	1.1	N/A

STANDARD DEVIATION (s.dup1): 0.6

W value: 1

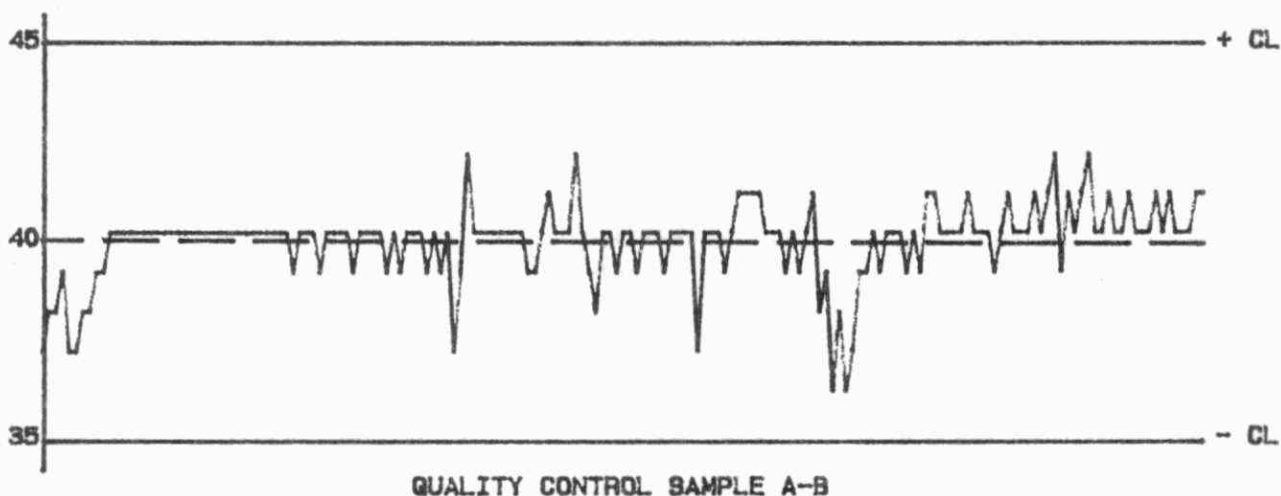
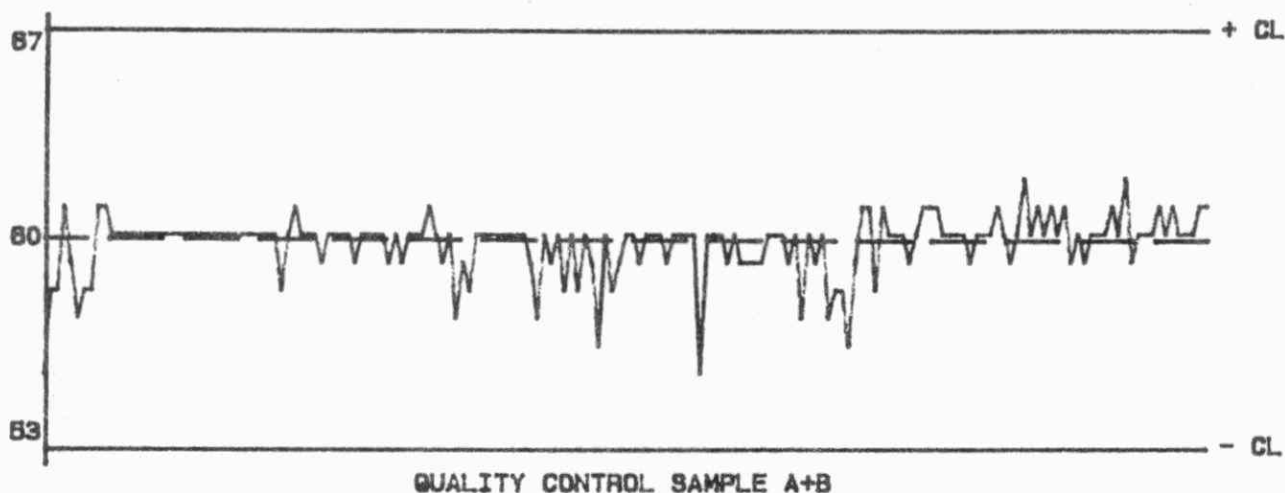
T value: 5

OTHER CHECKS:

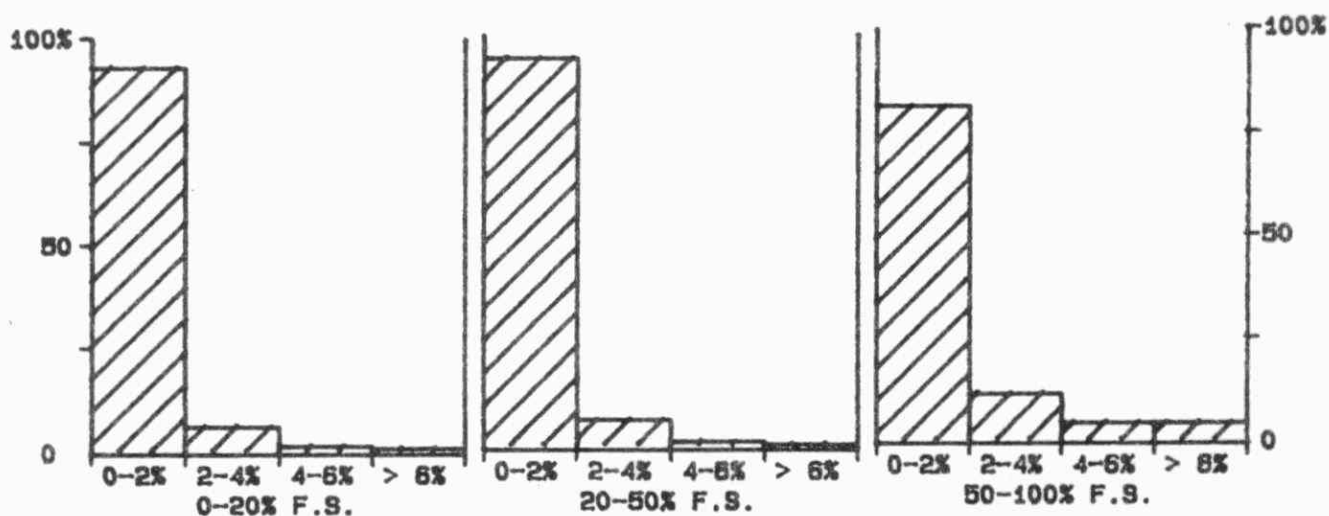
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	173	0	0.0

QUALITY CONTROL GRAPHS COLOUR - TRUE (HZV)

FROM: 07/01/86
TO: 18/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 HZV

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Domestic Water	Method Introduced:	01/04/74
LIS Test Name Code:	COND25	Units	: uS/cm at 25 C
Work Station Code	: WPC	Unit Code	: 350351
Method Code	: 002A12	Supervisor	: P. Campbell
Sample Type/Matrix:	Domestic Waters, Leachates		

SAMPLING:

Quantity Required: 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell and equilibrated to 25 C. The conductivity is read directly from a digital display.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: N/A T value: N/A

CONTROLS:

Calibration : BL plus 3 standards, eg, QCA

MODIFICATIONS:

14/03/86 -THIS TEST PROCEDURE WAS AUTOMATED AND ASSIGNED TO THE WATS WORKSTATION. SEE COND25 AT WATS WORKSTATION FOR STATISTICS.

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Dorset	Methods Introduced:	01/06/76
LIS Test Name Code:	COND25	Units	: uS/cm at 25 C
Work Station Code	: DOCC	Unit Code	: 350351
Method Code	: 0903CM	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation			

AMPLING:

Quantity Required: 75 mL.
Container : Polystyrene

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell and equilibrated to 5 C. The conductivity is read directly from a digital display.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.2** T value: 5

CALIBRATION:

None

CONTROLS:

Calibration: BL plus 2 standards, eg, QCA

NOTES:

*T value is based on duplicate analyses at concentrations above the lowest range.

CONDUCTIVITY
 QUALITY CONTROL DATA FROM 07/01/86 TO 18/12/86

Lab: Dorset

Analytical Range: 1 to 300 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	179	290	292	2	0.6
b :	179	74	75	1	0.5
a+b :	179	364	367	3	0.9
a-b :	179	216	217	1	0.7

s.d.(AB): SW(within run): 0.5 S(between runs): 0.6 S/SW: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

351 to 377 for A+B
 207 to 225 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 10.0	N/A	N/A
13	10.0 - 20.0	0.17	0.9
361	20.0 - 50.0	0.21	0.7
19	50 - 100	0.2	0.3
20	100 - 300	0.7	0.5
414	Overall	0.3	N/A

STANDARD DEVIATION (s.dup1): 0.17

W value: 0.2

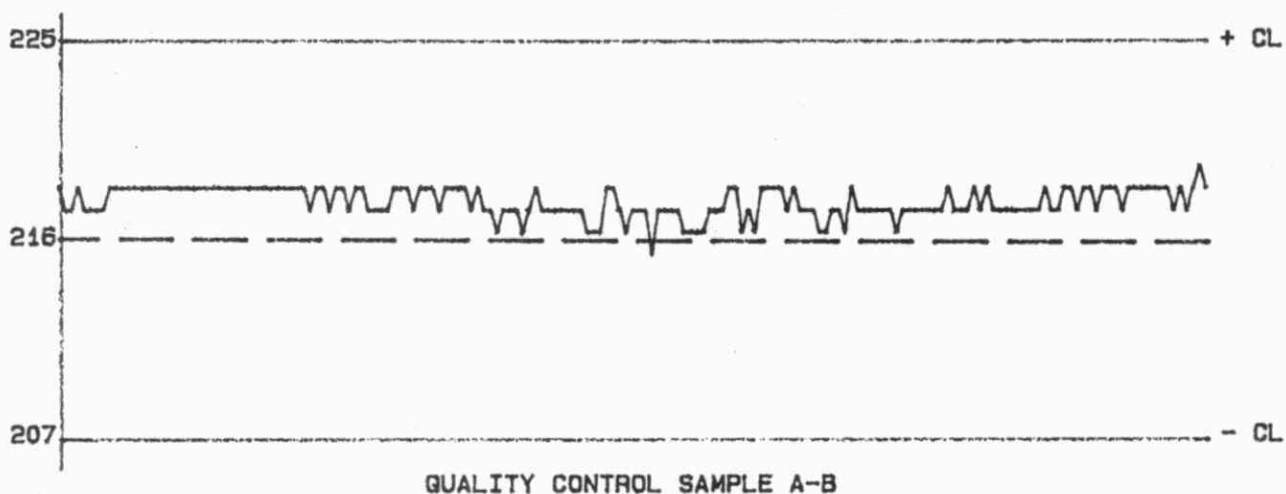
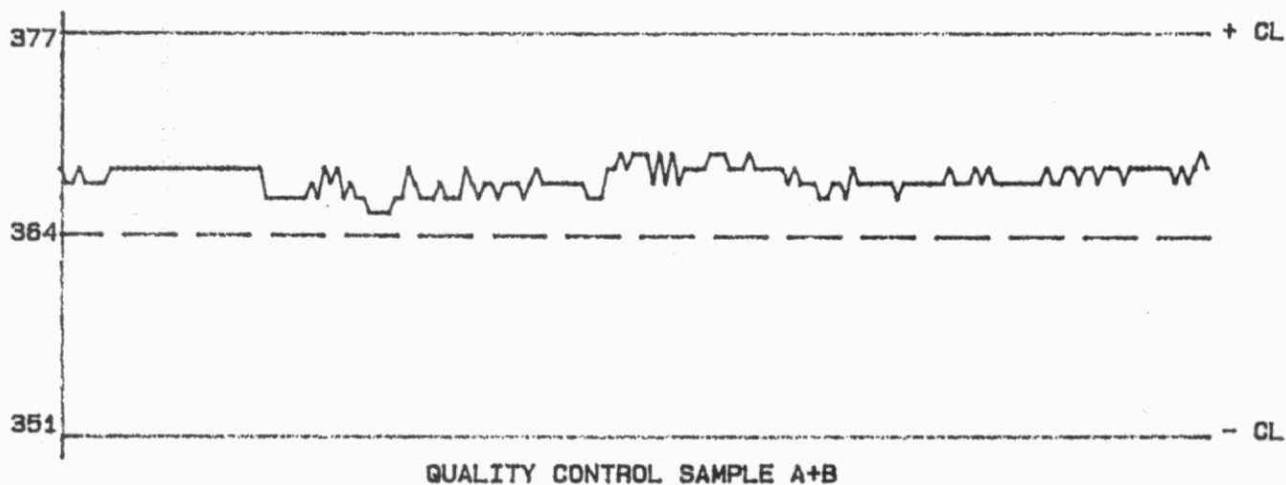
T value: 1

OTHER CHECKS:

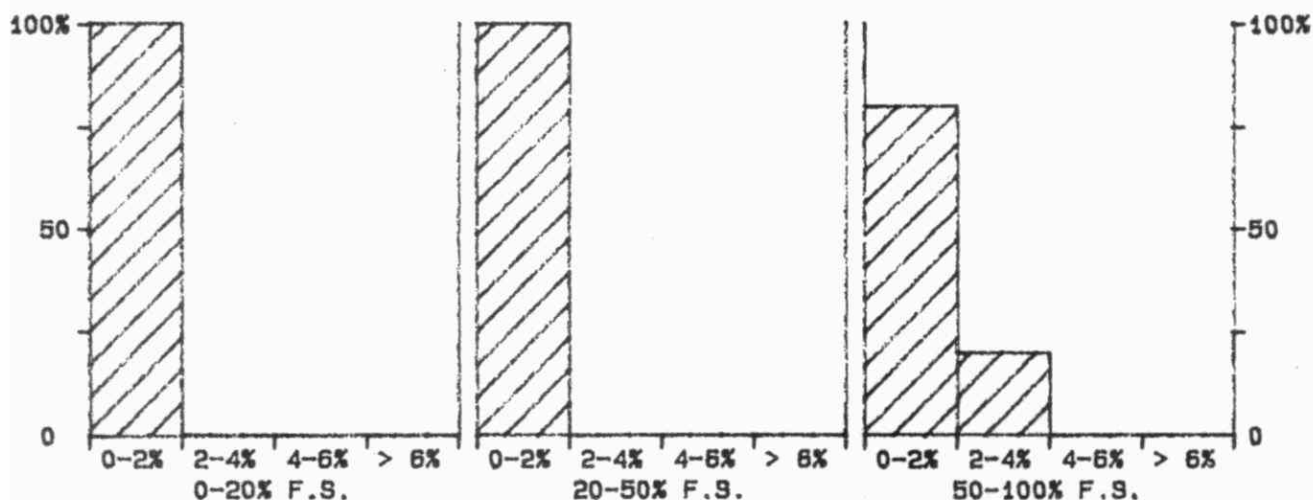
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	179	1	0.4

QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 07/01/86
TO: 18/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 300 US/CM

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/04/78
LIS Test Name Code: COND25 Units : uS/cm at 25 C
Work Station Code : PRIC1 Unit Code : 350351
Method Code : 002BIZ Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow

SAMPLING:

Quantity Required: 15 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

After equilibration at 25 C, the conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

Compatibility between conductivity meter and chart recorder is confirmed by checking 3 standard resistances

CONTROLS:

Calibration: LTBL plus 2 standards, eg, QCA
Drift : 1 solution every 10 samples

MODIFICATIONS:

18/10/83 -Automated continuous flow system was introduced.

NOTES:

A calibration standard for the ion chromatographic system is utilized as a drift control for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 07/01/86 TO 04/12/86

Lab: Ion Chromatography

Analytical Range: 1 to 100.0 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	109	44.5	45.4	0.9	0.77
b :	109	7.5	9.1	1.6	0.23
a+b :	109	52.0	54.6	2.6	0.89
a-b :	109	37.0	36.3	-0.7	0.71

s.d.(AB): Sw(within run): 0.50 S(between runs): 0.57 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

41.5. to 62.5 for A+B
 30.0 to 44.0 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
43	0.0 - 10.0	0.48	8.9
47	10.0 - 20.0	0.80	5.4
95	20.0 - 50.0	0.80	2.5
12	50.0 - 100.0	1.63	2.7
197	Overall	0.82	N/A

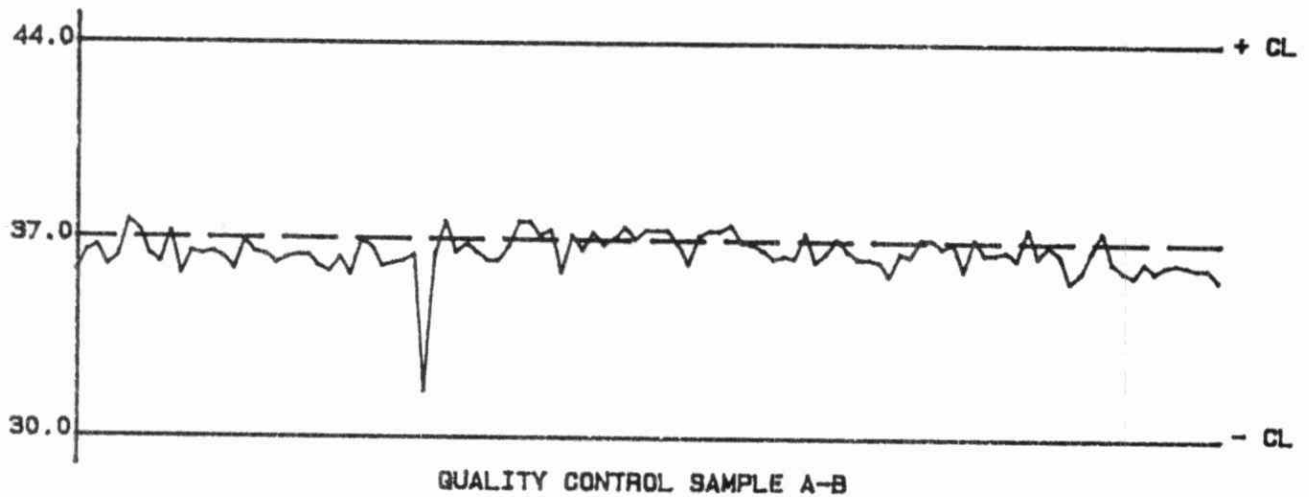
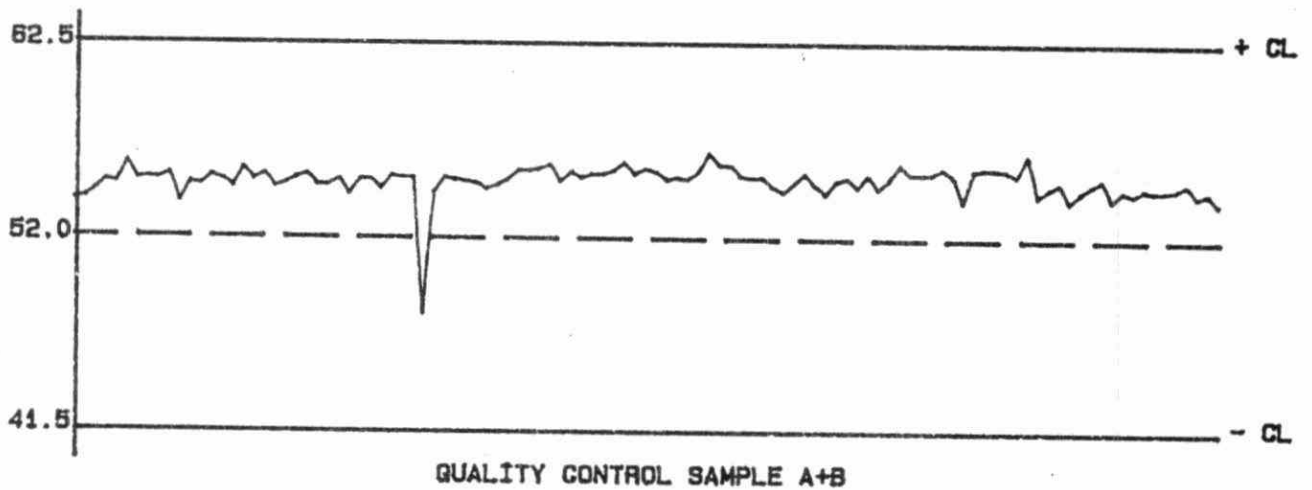
STANDARD DEVIATION (s.dup1): 0.48

W value: 0.2

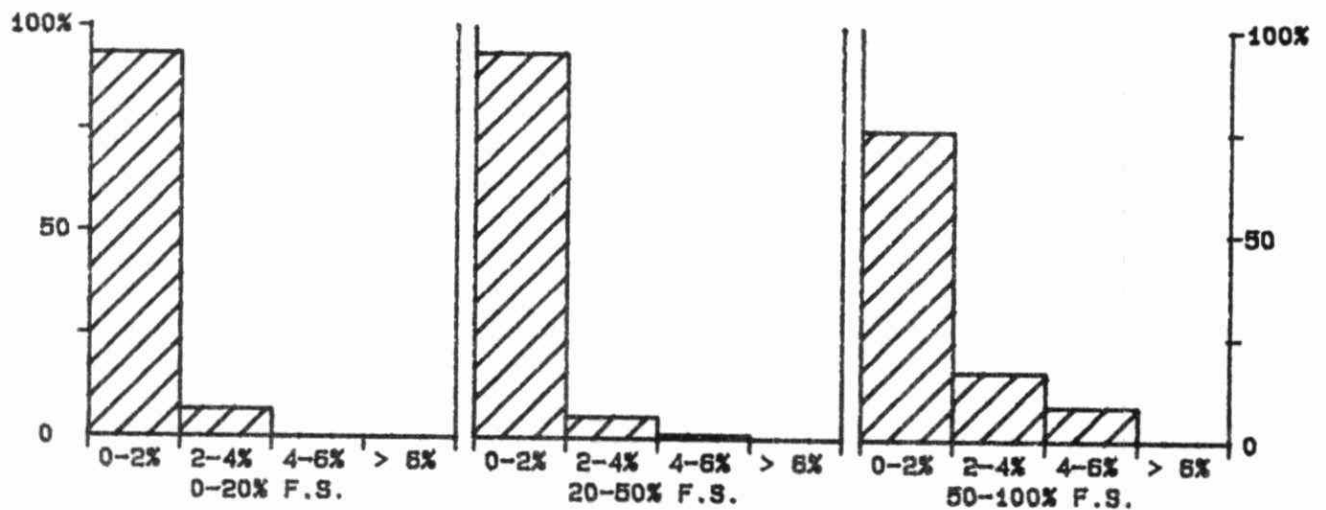
T value: 1

QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 07/01/86
TO: 04/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 US/CM

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	Before '74
LIS Test Name Code:	COND25	Units	: uS/cm at 25 C
Work Station Code :	COND-SEW	Unit Code	: 350351
Method Code	: 002A12	Supervisor	: P. Campbell
Sample Type/Matrix:	Sewage, Effluents		

SAMPLING:

Quantity Required: 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25 C, the conductivity of the sample is measured; samples are filtered first if necessary.

INSTRUMENTATION

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5 T value: 25

CALIBRATION:

None

CONTROLS:

Calibration: BL plus 3 standards, eg, QCA

CONDUCTIVITY
QUALITY CONTROL DATA FROM 10/01/86 TO 15/12/86

Lab: Titration

Analytical Range: 25 to 3000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	46	1413	1408	-5	6.4
b :	46	717.8	716.5	-1.3	4.17
a+b :	46	2130.8	2124.7	-6.1	9.71
a-b :	46	695.2	691.3	-3.4	4.68

s.d.(AB): SW(within run): 3.3 S(between runs): 5.4 S/SW: 1.63

On any given day the calibration is accepted if the values obtained lie within the ranges:

2040.8 to 2220.8 for A+B
 635.2 to 755.2 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	9	0 - 500	5.5	1.5
	5	500 - 1000	8.0	1.0
	3	1000 - 1500	4.6	0.4
	0	1500 - 3000	N/A	N/A
	17	Overall	6.2	N/A

STANDARD DEVIATION (s.dup1): 5.5

W value: 5

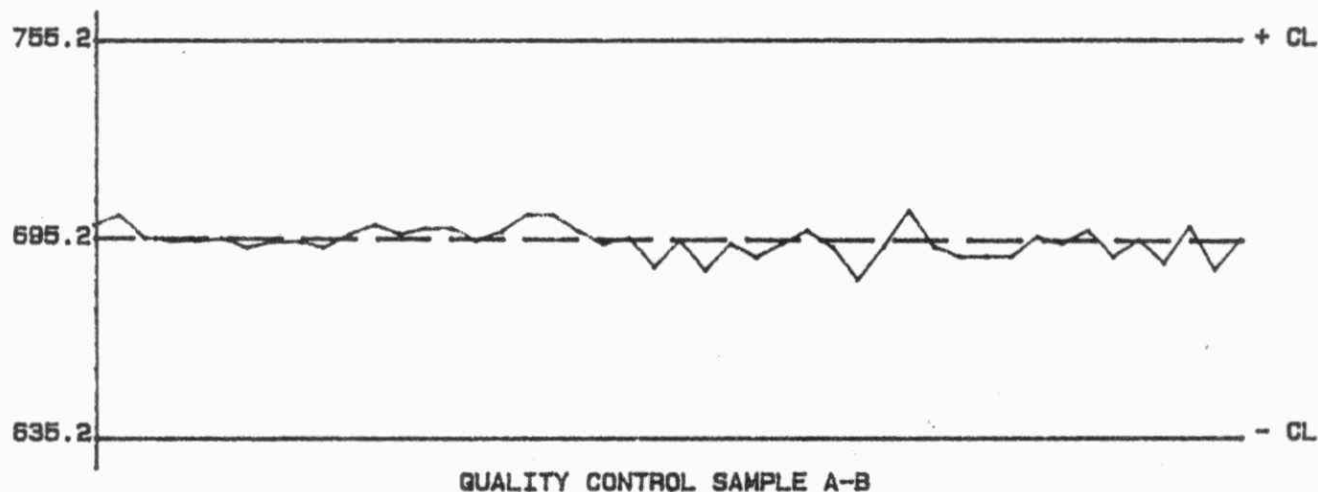
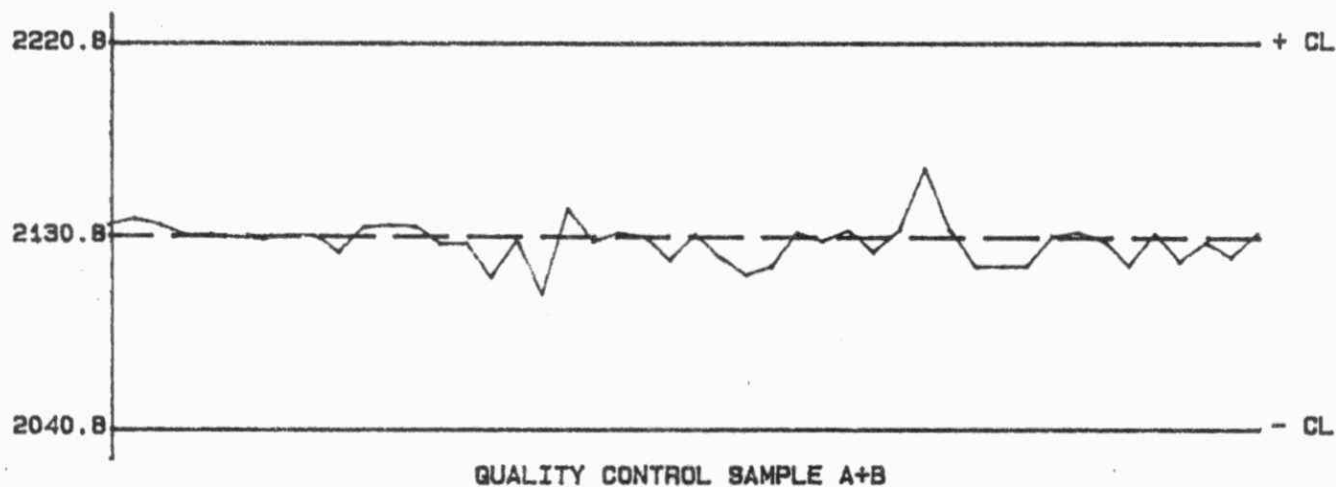
T value: 25

OTHER CHECKS:

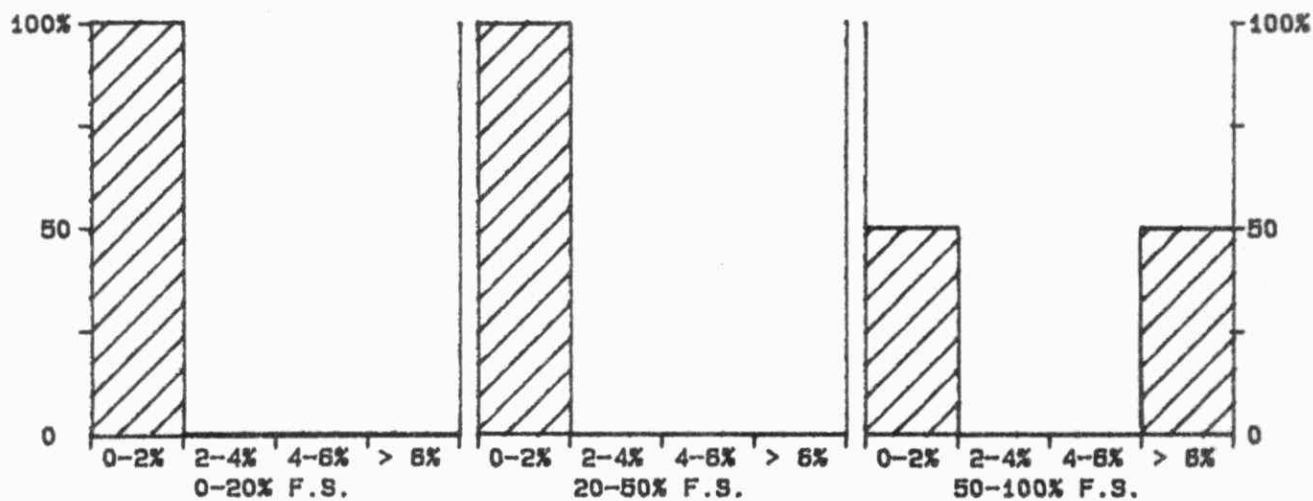
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	46	0.77	0.178

QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 10/01/86
TO: 15/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 US/CM

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	01/04/74
LIS Test Name Code:	COND25	Units	: uS/cm at 25 C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002B12	Supervisor	: P. Campbell
Sample Type/Matrix:	Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required: 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25 C, the conductivity of the sample is measured. N.B. pH, Gran alkalinity and total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising sampler, water bath, conductivity meter with plus cell with microcomputer control and data processing.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : In run standards throughout the run, diluted tap water (20% V/V)

MODIFICATIONS:

01/04/84 -Automated system introduced for conductivity range 20-1000 uS/cm.
09/05/85 -Analytical stream is not flowing during conductivity measurement.
Radiometer conductivity meter was changed from model CDM 3 to model CDM 83. The analytical range was expanded: 1 to 3000 uS/cm. This expansion was feasible due to the use of the auto-ranging CDM 83 module. The system has direct computer (DCI) capabilities.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Titration

Analytical Range: 5 to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	121	718	717	-1	3.3
b :	121	147	149	2	0.9
a+b :	121	865	866	1	3.8
a-b :	121	571	568	-3	3.0
c :	121	147.0	149.4	2.4	0.87
d :	121	37.1	38.5	1.4	0.39
c+d :	121	184.1	188.0	3.9	1.03
c-d :	121	109.9	110.9	1.0	0.87

s.d.(AB): Sw(within run): 2.1 S(between runs): 2.4 S/Sw: 1.14
s.d.(CD): Sw(within run): 0.62 S(between runs): 0.67 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

775 to 955 for A+B
511 to 631 for A-B
178.1 to 190.1 for C+D
105.9 to 113.9 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	46	0 - 50	1.2	3.4
	62	50 - 200	1.4	1.4
	148	200 - 500	1.6	0.5
	58	500 - 1000	3.8	0.6
	12	1000 - 2000	5.0	0.4
	326	Overall	2.3	N/A

STANDARD DEVIATION (s.dupl): 1.2 W value: 1 T value: 5

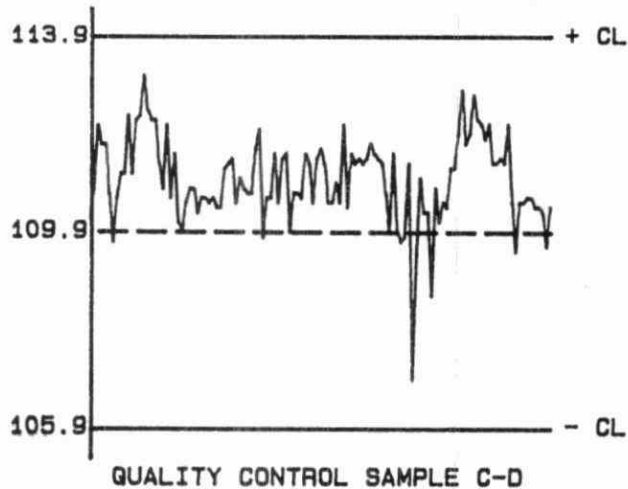
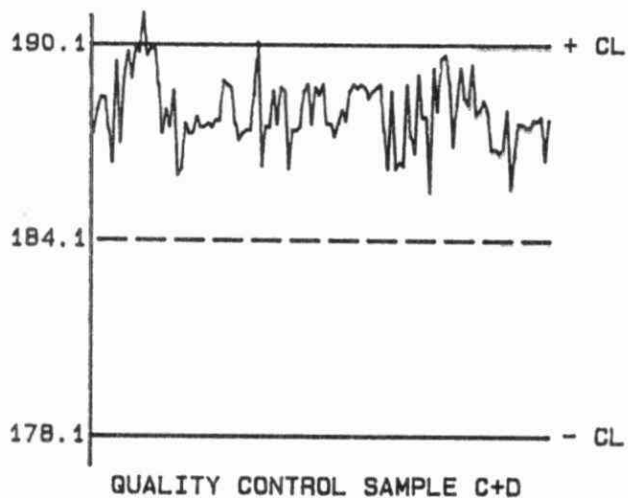
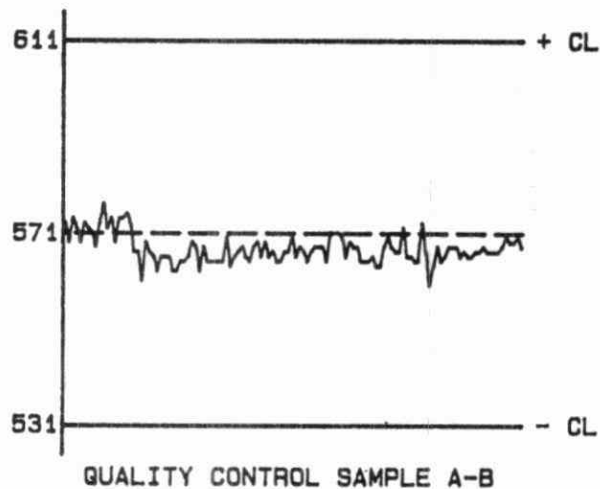
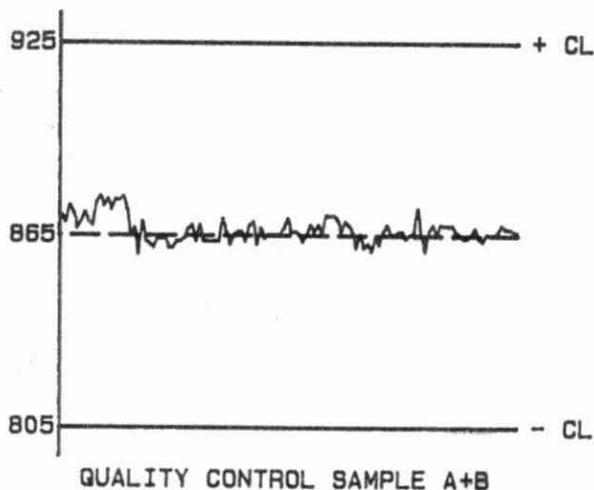
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Cell Constant :	0	N/A	N/A

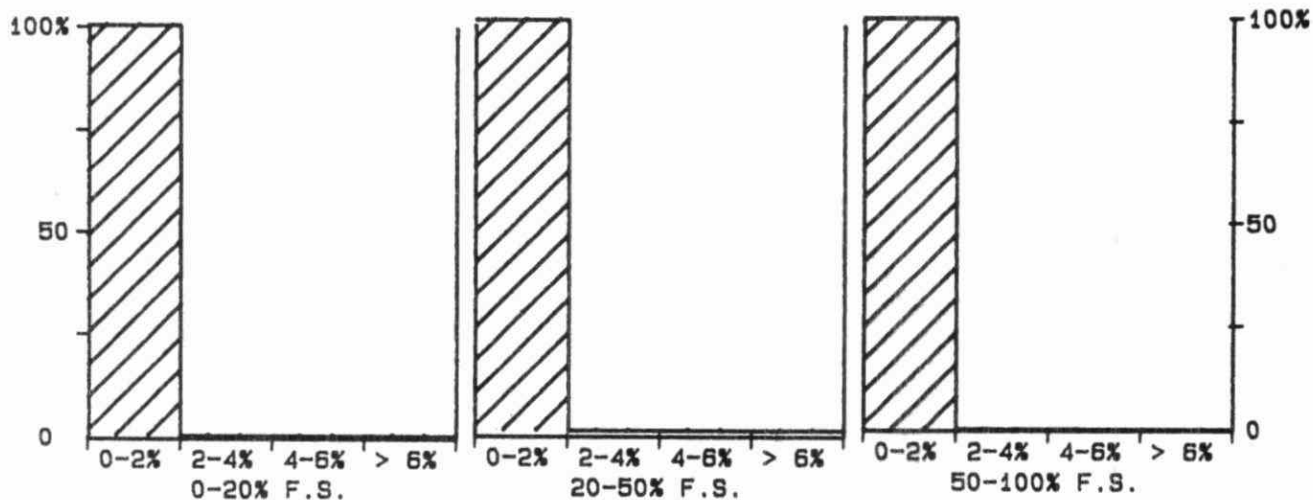
QUALITY CONTROL GRAPHS CONDUCTIVITY (US/CM)

FROM: 03/01/86

TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2000 US/CM

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	01/04/74
LIS Test Name Code:	COND25	Units	: uS/cm at 25 C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: P. Campbell
Sample Type/Matrix: Domestic Waters, Sewage, Effluents			

AMPLING:

Quantity Required: 25 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25 C, the conductivity of the sample is measured. N.B. H and total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising sampler, water bath, conductivity meter with plus cell with microcomputer control and data processing.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1* T value: 5

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : In run standards throughout the run, diluted tap water (50% V/V)

MODIFICATIONS:

14/03/86 -WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

CONDUCTIVITY
QUALITY CONTROL DATA FROM 14/03/86 TO 31/12/86

Lab: Titration

Analytical Range: 5 to 2000 uS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a	83	1413	1409	-4	7.5
b	83	718	716	-2	3.4
a+b	83	2131	2125	-6	9.8
a-b	83	695	693	-2	6.3
c	83	718.0	715.9	-2.1	3.38
d	83	147.0	148.9	1.9	1.31
c+d	83	865.0	864.8	-0.2	4.13
c-d	83	571.0	567.0	-4.0	3.04

s.d.(AB): SW(within run): 4.5 S(between runs): 5.8 S/SW: 1.31
s.d.(CD): SW(within run): 2.15 S(between runs): 2.56 S/SW: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

2041 to 2221 for A+B
635 to 755 for A-B
838.0 to 892.0 for C+D
553.0 to 589.0 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	6	0.0 - 50.0	0.82	2.2
	29	50 - 200	1.6	1.2
	85	200 - 500	2.1	0.6
	53	500 - 1000	3.4	0.5
	19	1000 - 2000	8.1	0.6
	192	Overall	3.5	N/A

STANDARD DEVIATION (s.dupl): 1.60

W value: 1

T value: 5

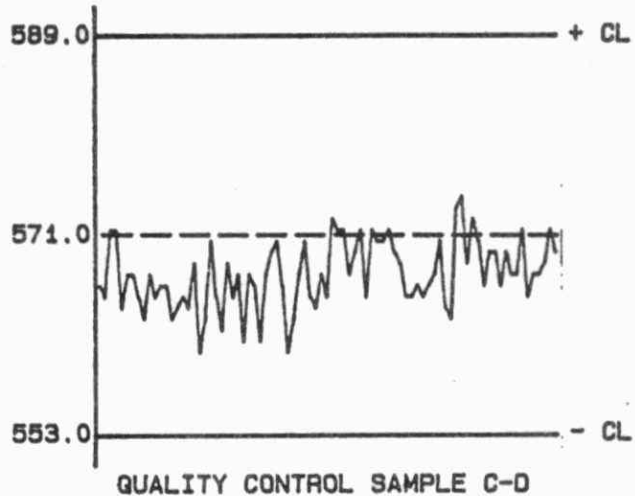
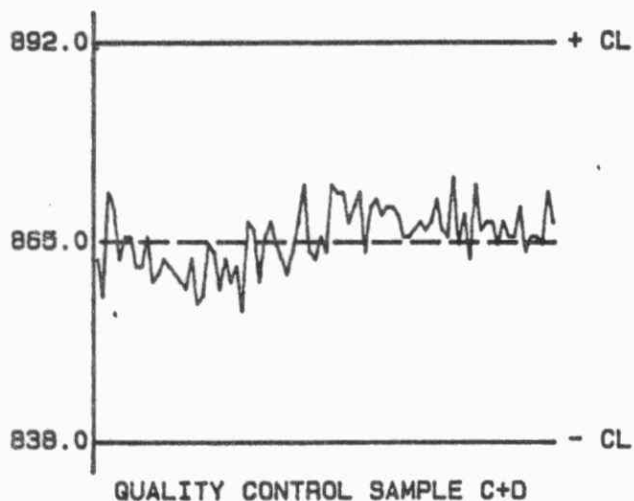
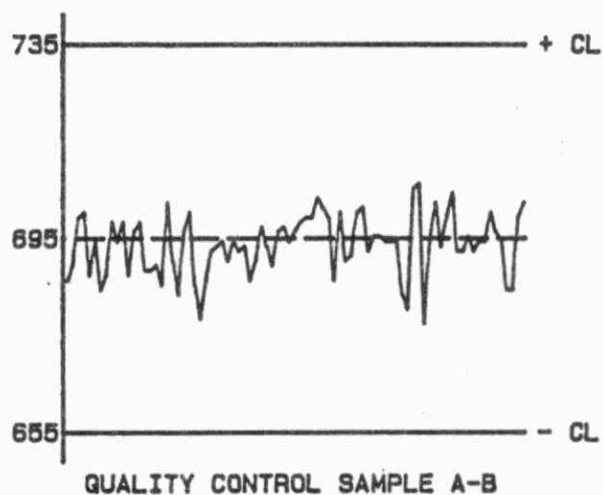
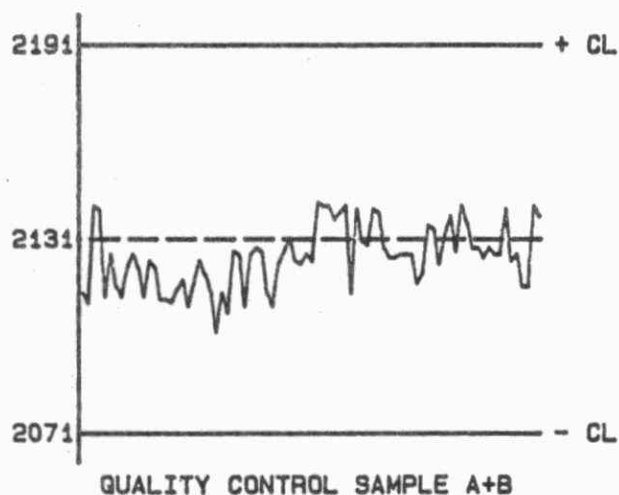
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Cell Const	0	N/A	N/A

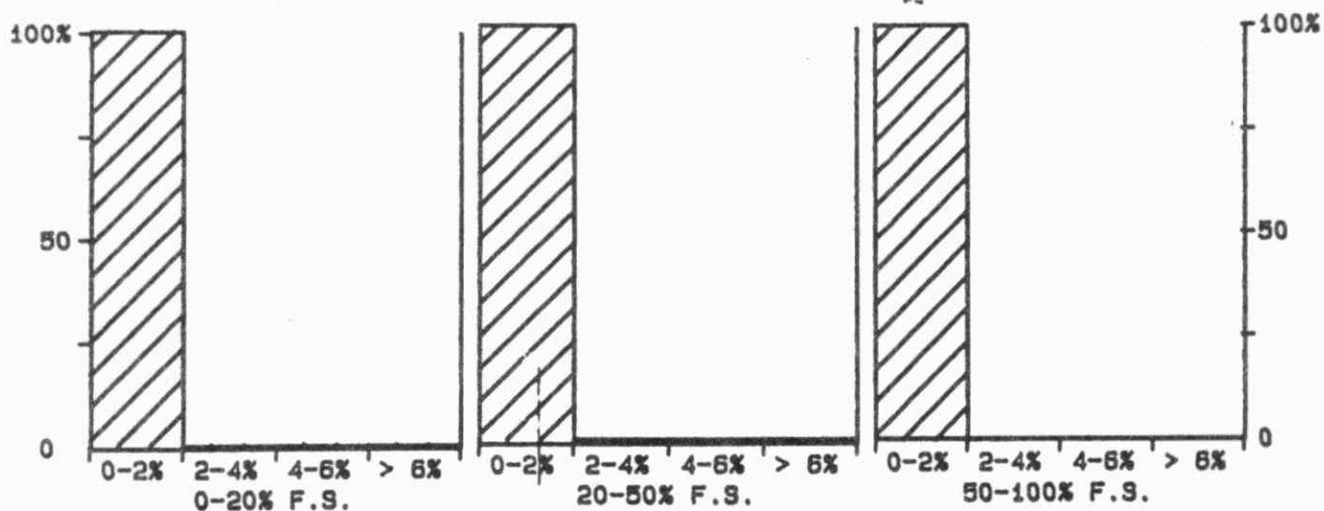
QUALITY CONTROL GRAPHS

CONDUCTIVITY (US/CM)

FROM: 14/03/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2000 US/CM

*** TOTAL COPPER - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	CUUT	Units	: ug/g as Cu
Work Station Code	: DOHMT	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 1 g (dry <150 um),
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample (air dried and grounded) plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125 C for 2 hours. The temperature is increased to 175 C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Cu by AAS at 324.8 nm using an air-acetylene flame. Approximate absorbance: 0.3 at the full scale value. Lead, nickel and zinc are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 0.5* T value: 2.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples.
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160 C to 175 C
06/01/86 -Samples analyzed on Varian 1275AAS (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown--average value used.

TOTAL COPPER - SOIL
QUALITY CONTROL DATA FROM 22/08/86 TO 05/09/86

Lab: Dorset Soils

Analytical Range: 2.5 to 25.0 ug/g as Cu

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	18.8	N/A	N/A	N/A
b :	0	6.3	N/A	N/A	N/A
a+b :	0	25.0	N/A	N/A	N/A
a-b :	0	12.5	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

21.3 to 28.7 for A+B
10.0 to 15.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	6	13.7	12.8	0.48
r2 :	6	15.6	14.8	0.47
r3 :	6	14.4	14.6	1.06

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 5.0	N/A	N/A
8	5.0 - 12.5	0.54	7.1
6	12.5 - 25.0	0.63	4.0
15	Overall	0.56	N/A

STANDARD DEVIATION (s.dup1): 0.54

W value: 0.5

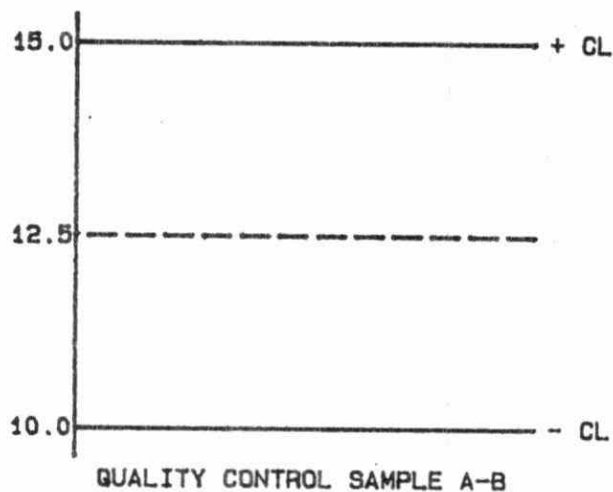
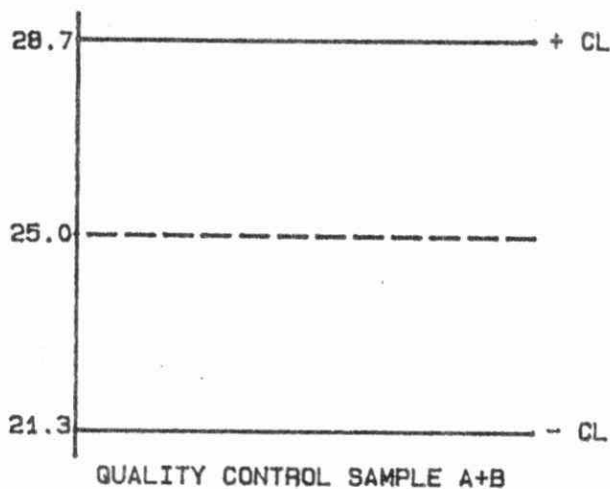
T value: 2.5

OTHER CHECKS:

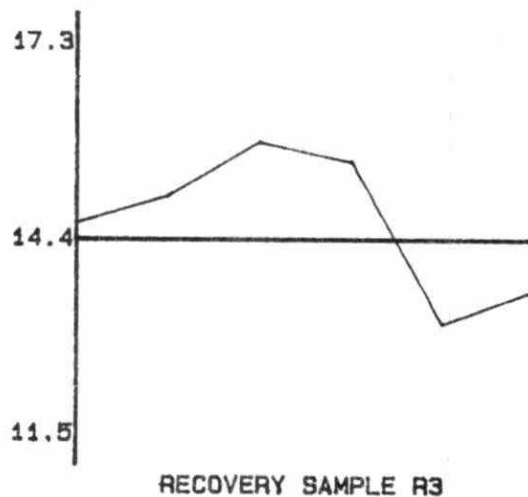
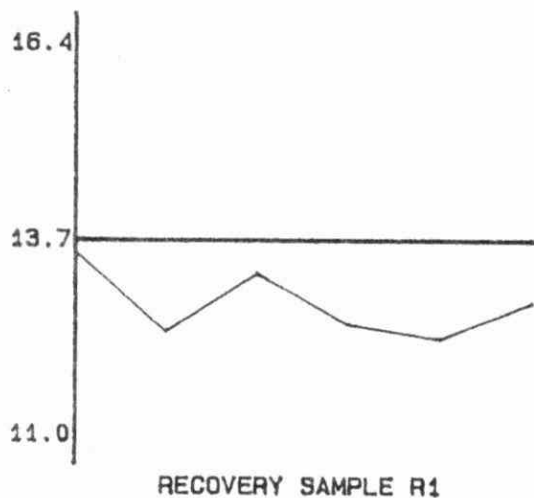
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	6	0.5	0.41

QUALITY CONTROL GRAPHS TOTAL COPPER - SOIL (UG/G AS CU)

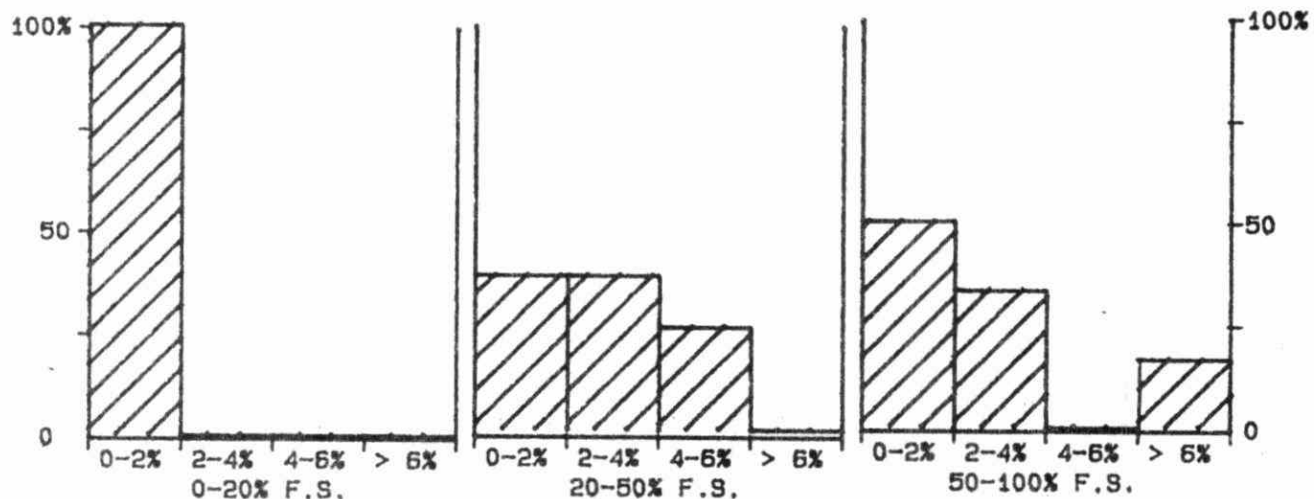
FROM: 22/08/86
TO: 05/09/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** FLUORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	Before '74
LIS Test Name Code:	FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064808
Method Code	: 003AC2	Supervisor	: M. Rawlings
Sample Type/Matrix:	Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160 C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex.
Approximate absorbance: 0.8 at the full scale level

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module.
Colourimetric measurement is through a 5.0 cm light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

NOTES:

1985 -WFF dropped and all samples now routed to WFNO3.

FLUORIDE
 QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Colourimetry

Analytical Range: 0.05 to 2.00 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	120	1.50	1.51	0.01	0.026
b :	120	0.30	0.31	0.01	0.012
a+b :	120	1.80	1.83	0.03	0.032
a-b :	120	1.20	1.20	0.00	0.025

s.d.(AB): SW(within run): 0.018 S(between runs): 0.020 S/SW: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

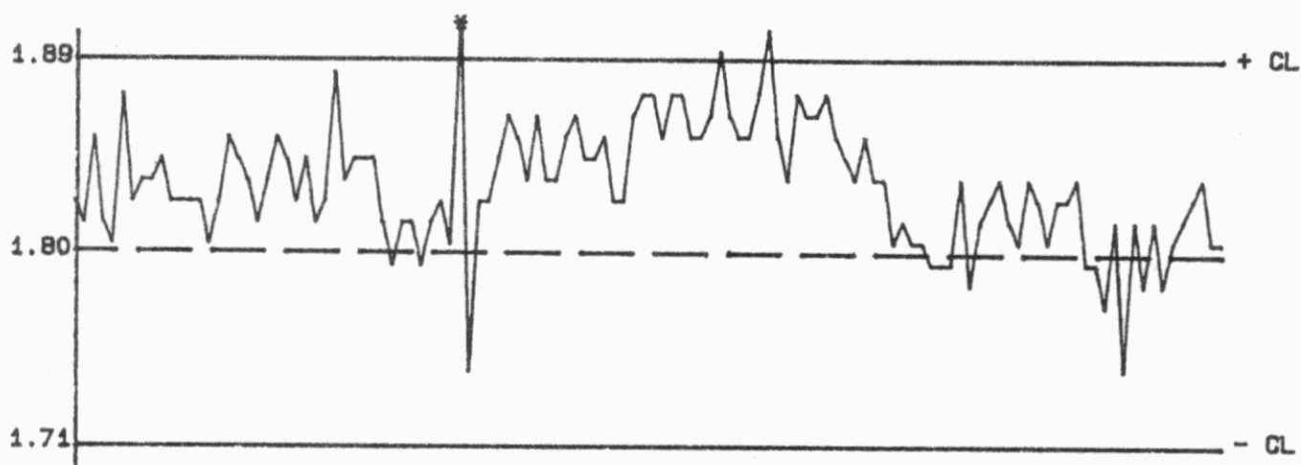
1.71 to 1.89 for A+B
 1.14 to 1.26 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	226	0.00 - 0.20	0.010	11.4
	37	0.20 - 0.50	0.014	4.6
	25	0.50 - 1.00	0.014	1.9
	31	1.00 - 2.00	0.021	1.7
	319	Overall	0.013	N/A

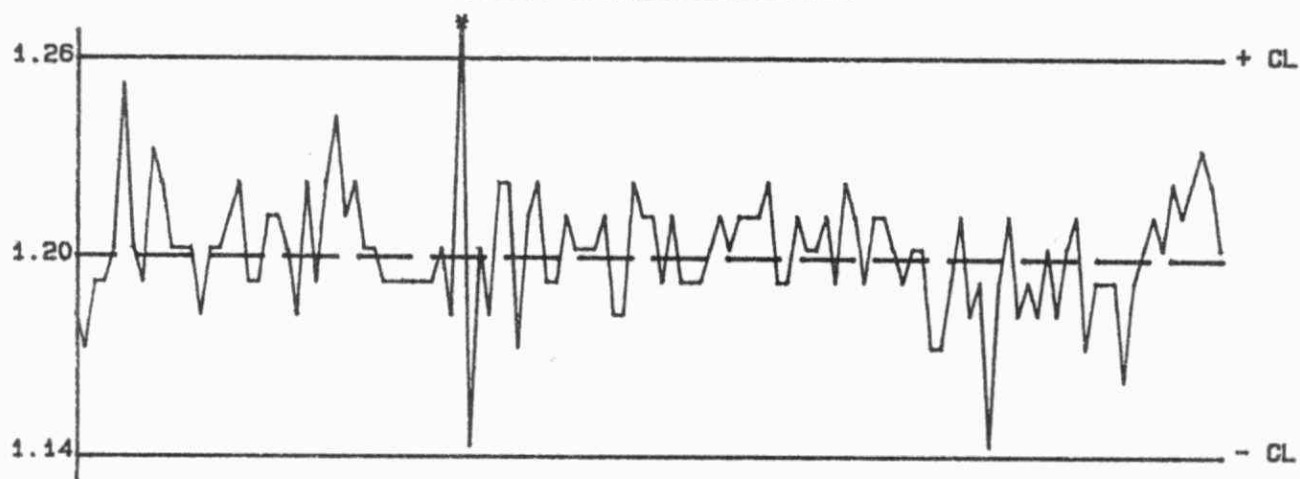
STANDARD DEVIATION (s.dup1): 0.010 W value: 0.01 T value: 0.05

QUALITY CONTROL GRAPHS FLUORIDE (MG/L AS F)

FROM: 03/01/86
TO: 31/12/86

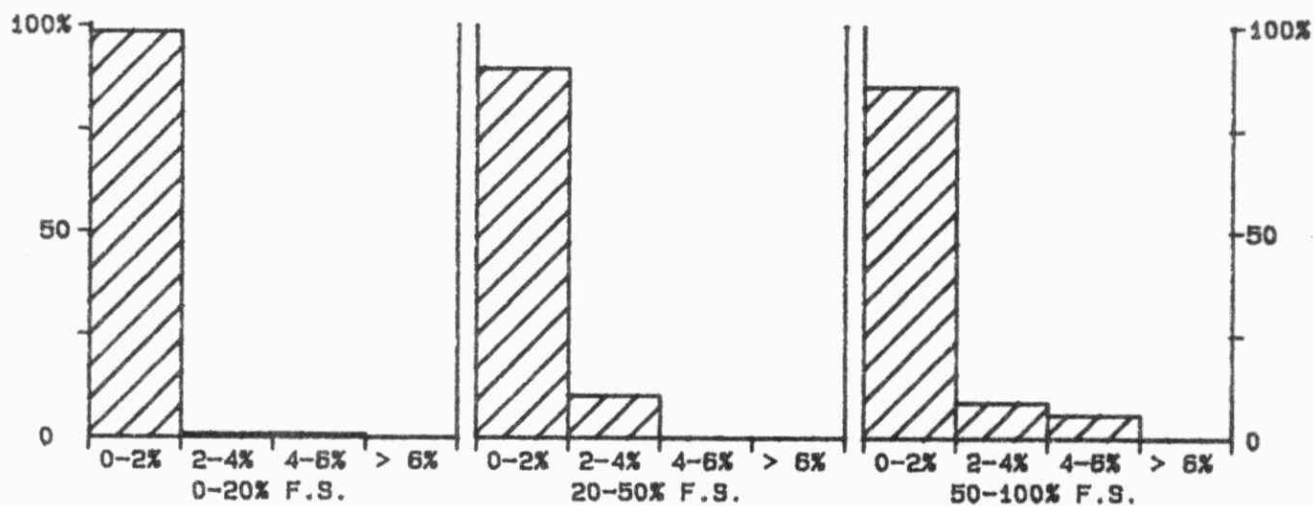


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS F

*** FLUORIDE ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/03/78
LIS Test Name Code:	FFIDUR	Units	: ug/L as F
Work Station Code	: DOSPF	Unit Code	: 063809
Method Code	: 001AIE	Supervisor	: A. Neary
Sample Type/Matrix:	Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required: 50 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Fluoride is determined via an automated flow system for which the detector is a specific ion electrode; prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL plus 1 standard in duplicate
Interference: Combined fluoride and aluminum standard confirms that aluminum is not an interference.

MODIFICATIONS:

01/03/82 -The above procedure is not described in HAMES, but a copy of the development report is available on request. The manual procedure in HAMES for the determination of fluoride by specific ion electrode is similar.

NOTES:

At the present time this procedure is restricted to special projects.
Values for recoveries are based upon the average recovery value obtained.

FLUORIDE
QUALITY CONTROL DATA FROM 28/01/86 TO 23/12/86

Lab: Dorset Soils

Analytical Range: 1 to 100.0 ug/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	81	48.0	47.9	-0.1	0.85
b :	81	24.0	23.6	-0.4	0.77
a+b :	81	72.0	71.5	-0.5	1.48
a-b :	81	24.0	24.3	0.3	0.90

s.d.(AB): Sw(within run): 0.64 S(between runs): 0.86 S/Sw: 1.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

64.5 to 78.5 for A+B
 18.0 to 28.0 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
29	0.0 - 20.0	0.42	4.6
130	20.0 - 50.0	0.85	2.2
68	50.0 - 100.0	1.15	1.9
227	Overall	0.81	N/A

STANDARD DEVIATION (s.dup1): 0.42

W value: 0.2

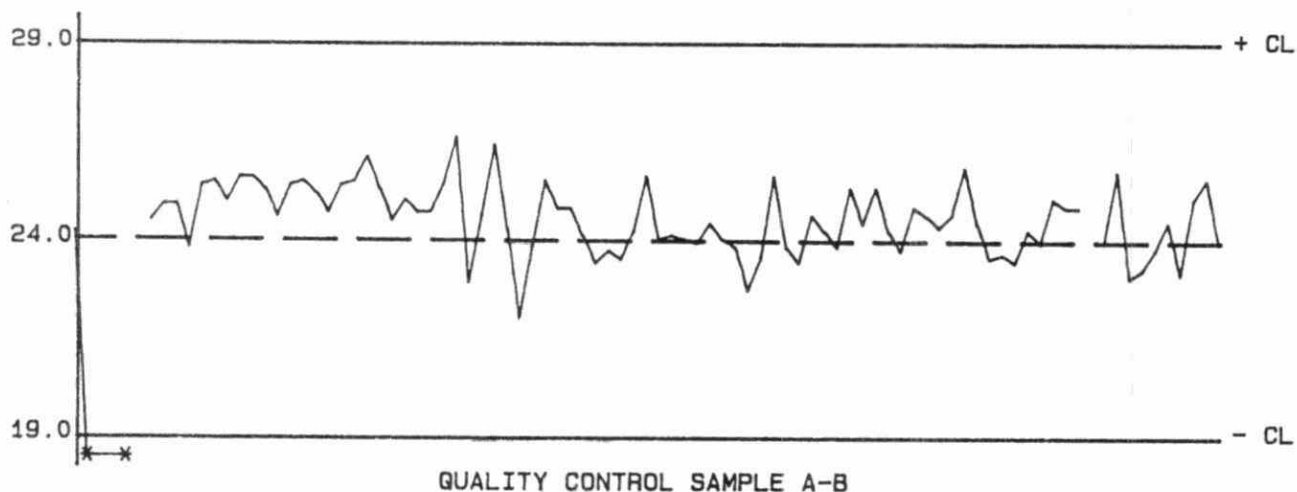
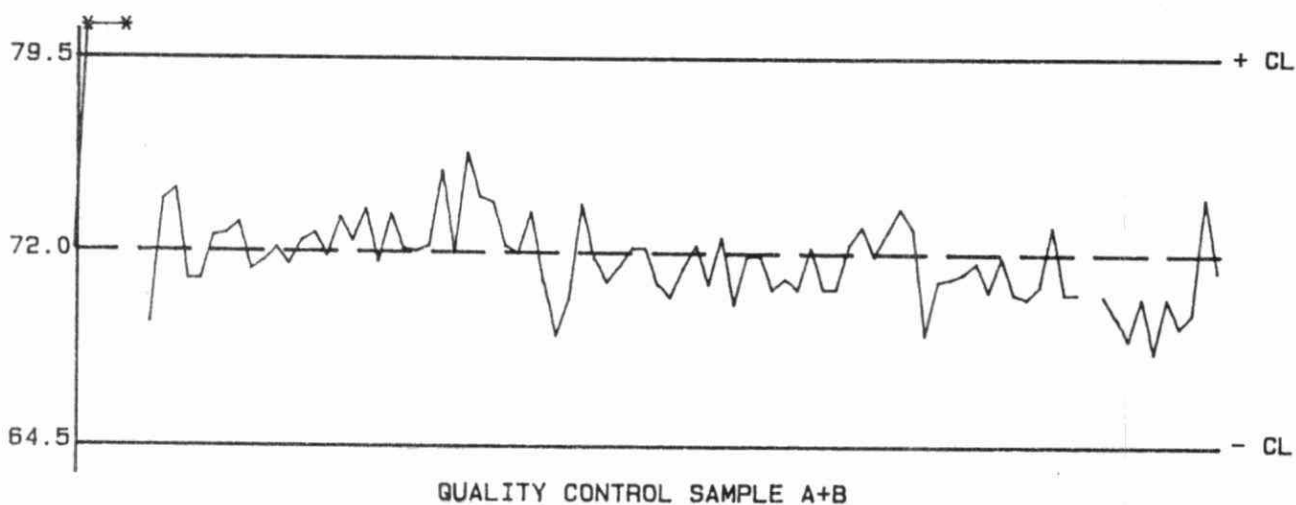
T value: 1

OTHER CHECKS:

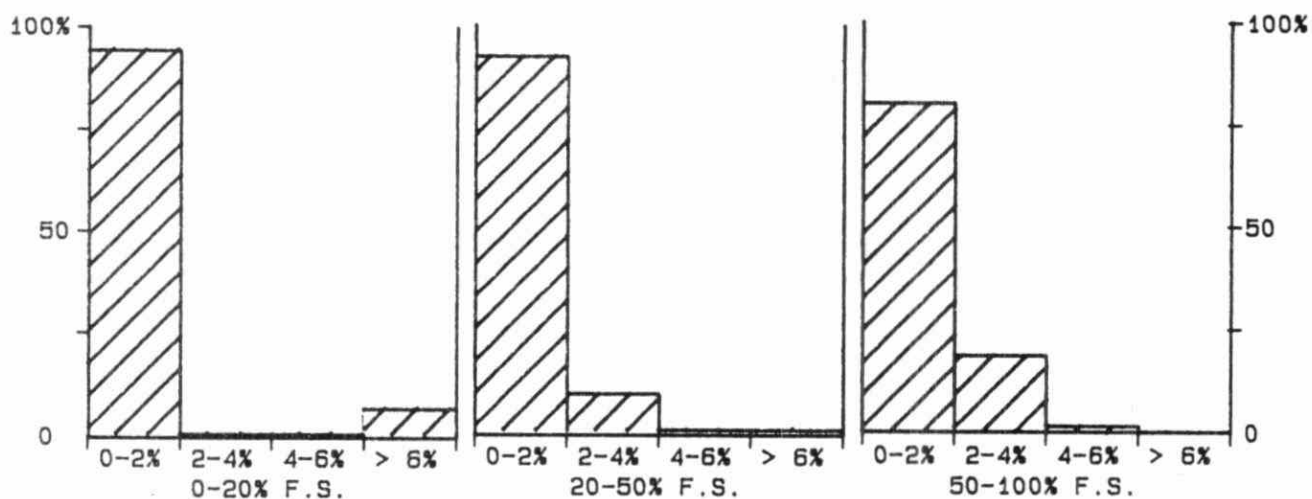
	Number of Data	Data Mean	Standard(1) Deviation
Al Interference	79	60.1	1.02

QUALITY CONTROL GRAPHS FLUORIDE (UG/L AS F)

FROM: 01/01/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/L AS F

*** IRON - SOIL (Xdi) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	FEED1	Units	: % by weight Fe
Work Station Code	: DOMETDI	Unit Code	: 070826
Method Code	: 301AA5	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 0.5 g (dry <150 um).
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

Iron is extracted from a 0.25 g soil sample using sodium citrate, sodium bicarbonate and sodium dithionite at 80 C (procedure is repeated twice). The sample is washed twice and its washings and extracts are combined and diluted to 10 mL with deionized water. The final solution is analyzed by AAS at 248.3 nm with an air-acetylene flame.
Approximate absorbance: 0.3 at the full scale level.
Aluminum is determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02* T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaces Perkin Elmer 403

NOTES:

Values for recoveries are unknown--average value used.

IRON - SOIL (Xdi)
QUALITY CONTROL DATA FROM 14/11/86 TO 31/12/86

Lab: Dorset Soils

Analytical Range: 0.1 to 2.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	1.50	N/A	N/A	N/A
b :	0	0.50	N/A	N/A	N/A
a+b :	0	2.00	N/A	N/A	N/A
a-b :	0	1.00	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.85 to 2.15 for A+B
0.90 to 1.10 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	11	1.18	1.14	0.048
r2 :	11	1.06	1.00	0.101
r3 :	11	0.93	0.90	0.056

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.00 - 0.40	0.023	6.7
22	0.40 - 1.00	0.034	5.5
14	1.00 - 2.00	0.042	3.5
42	Overall	0.036	N/A

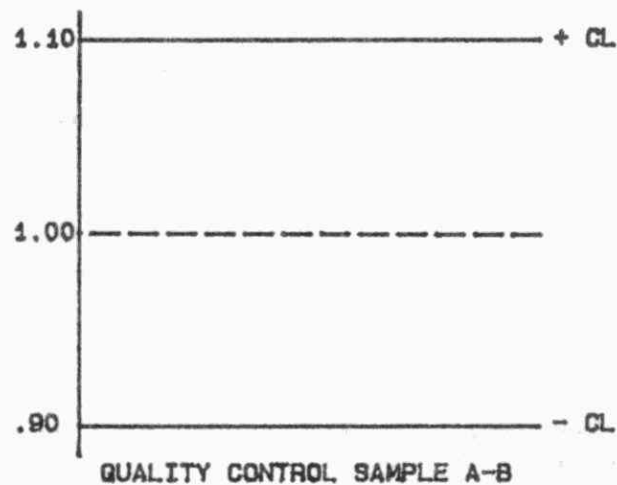
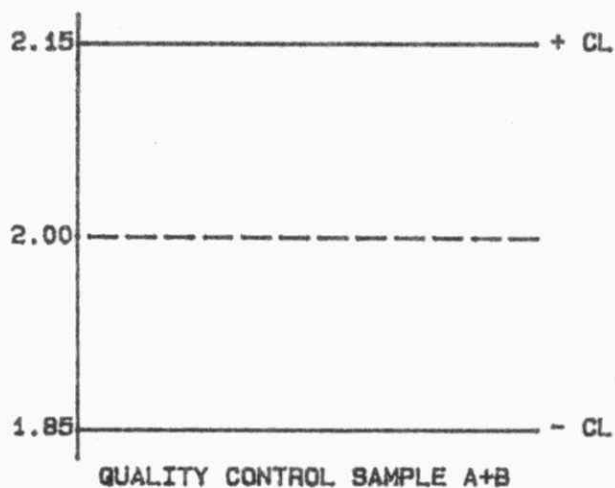
STANDARD DEVIATION (s.dupl): 0.034 W value: 0.02 T value: 0.1

OTHER CHECKS:

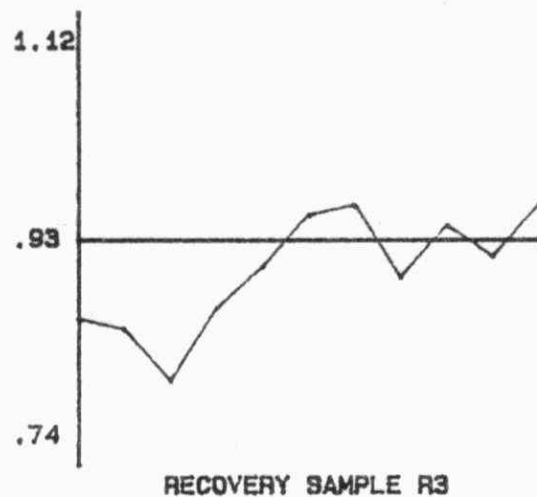
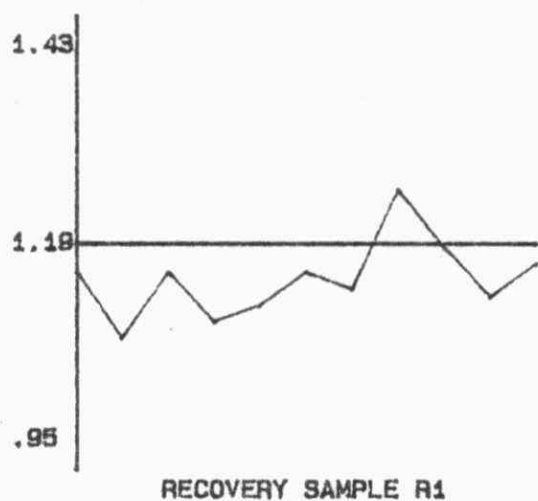
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	11	0.00	0.000

QUALITY CONTROL GRAPHS IRON - SOIL (XDI) (% AS FE)

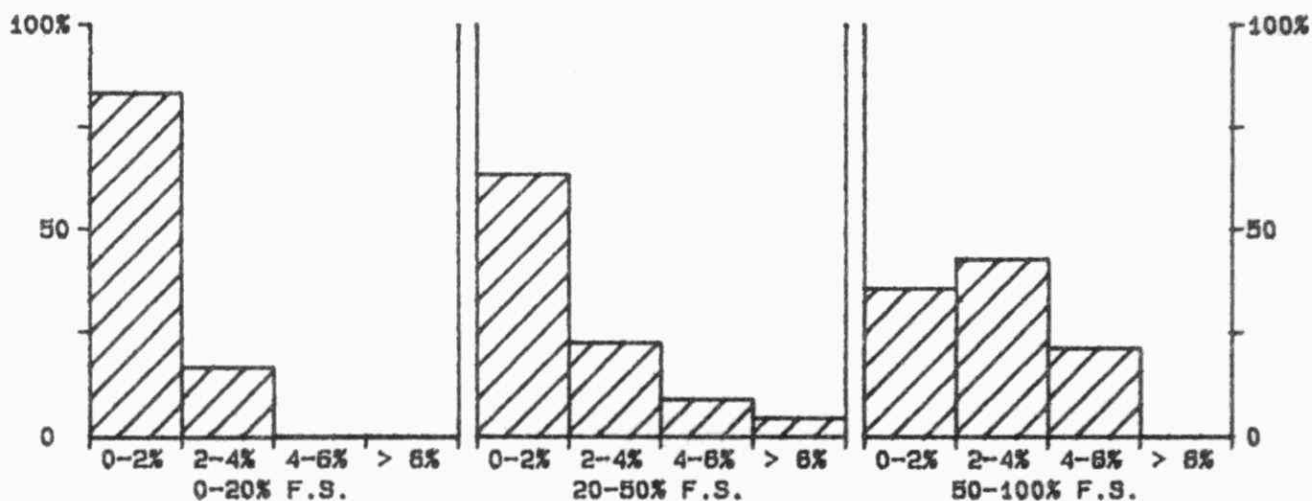
FROM: 14/11/86
TO: 31/12/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** IRON - SOIL (Xpy) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	FEEPY	Units	: % by weight Fe
Work Station Code	: DOMETALX	Unit Code	: 070826
Method Code	: 703AA5	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 0.6 g (dry <150 um),
Container : Glass vials

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.300 g quantity of sample plus 30 mL of 0.1 M sodium pyrophosphate is agitated overnight in a centrifuge tube. Samples are centrifuged at 20,000 rpm for 10 minutes and the supernatant is analyzed by AAS at 248.3 nm with an air-acetylene flame.

Approximate absorbance: 0.3 at the full scale level.

Aluminum and manganese may be determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/06/86 -Varian AA1275 replaces Perkin Elmer 403

NOTES:

Values for recoveries are unknown--average value used.

IRON - SOIL (Xpy)
QUALITY CONTROL DATA FROM 11/09/86 TO 26/09/86

Lab: Dorset Soils

Analytical Range: 0.025 to 1.00 % as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.75	N/A	N/A	N/A
b :	0	0.25	N/A	N/A	N/A
a+b :	0	1.00	N/A	N/A	N/A
a-b :	0	0.50	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.92 to 1.07 for A+B
0.45 to 0.55 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	8	0.58	0.55	0.015
r2 :	8	0.26	0.28	0.041
r3 :	8	0.67	0.61	0.064

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
16	0.00 - 0.20	0.009	7.4
8	0.20 - 0.50	0.010	3.2
7	0.50 - 1.00	0.020	2.6
31	Overall	0.012	N/A

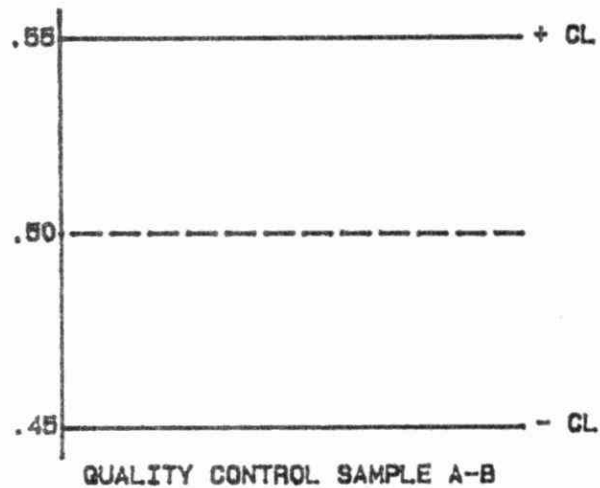
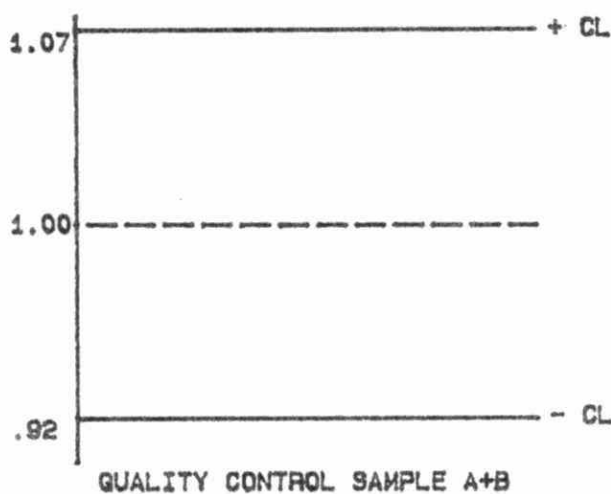
STANDARD DEVIATION (s.dupl): 0.009 W value: 0.005 T value: 0.025

OTHER CHECKS:

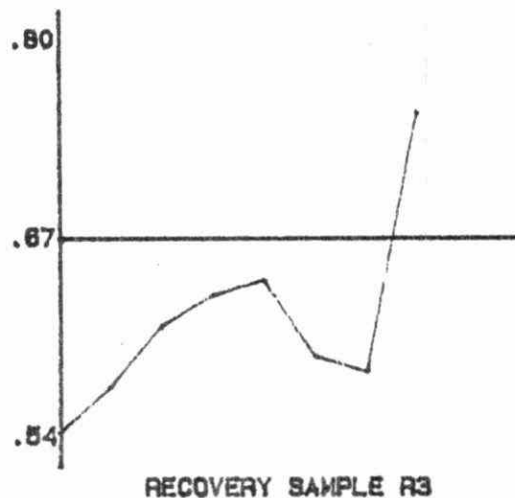
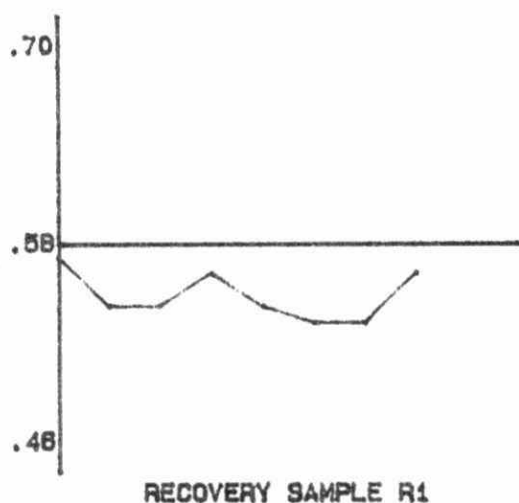
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	8	0.00	0.000

QUALITY CONTROL GRAPHS IRON - SOIL (XPY) (% AS FE)

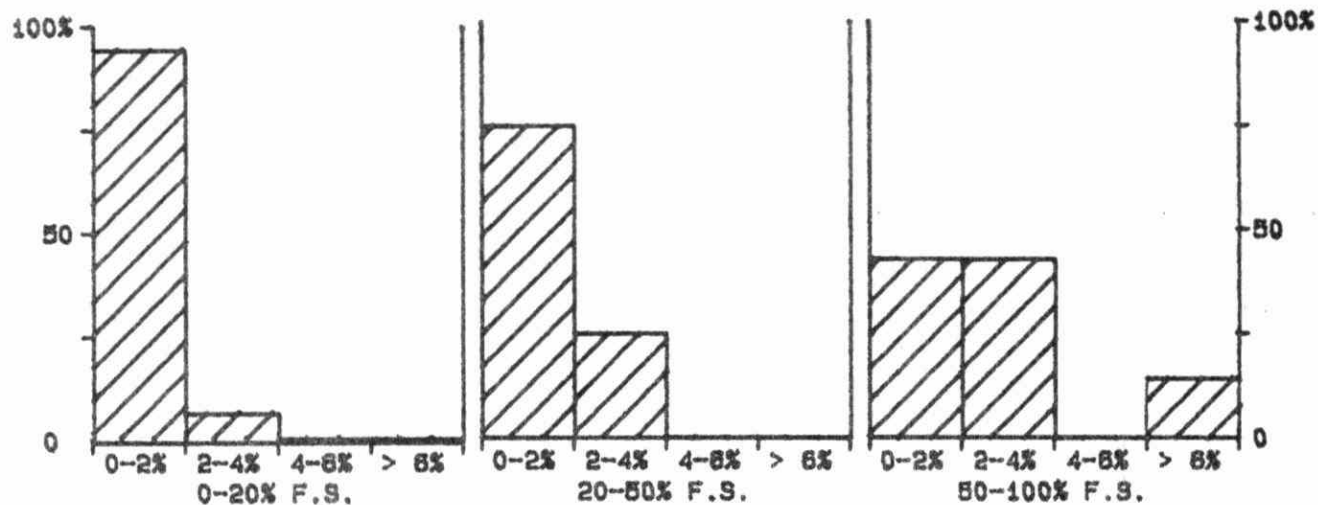
FROM: 11/09/86
TO: 26/09/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 % AS FE

*** TOTAL LEAD - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	PBUT	Units	: ug/g as Pb
Work Station Code	: DOHMTE	Unit Code	: 073882
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 1 g (dry <150 um),
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample (air dried and grounded) plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125 C for 2 hours. The temperature is increased to 175 C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Pb by AAS at 217.0 nm using an air-acetylene flame. Approximate absorbance: 0.1 at the full scale level. Copper, nickel and zinc are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 2 T value: 10

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples.
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160 C to 175 C
06/01/86 -Samples analyzed on Varian 1275AAS (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values for recoveries are unknown--average value is used.

TOTAL LEAD - SOIL
QUALITY CONTROL DATA FROM 22/08/86 TO 31/12/86

Lab: Dorset Soils

Analytical Range: 10 to 100.0 ug/g as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	150.0	N/A	N/A	N/A
b :	0	50.0	N/A	N/A	N/A
a+b :	0	200.0	N/A	N/A	N/A
a-b :	0	100.0	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

185.0 to 215.0 for A+B
90.0 to 110.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	6	6.0	3.1	0.84
r2 :	6	13.8	8.3	0.98
r3 :	6	23.0	19.5	1.39

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
13	0.0 - 50.0	2.06	16.4
1	50.0 - 100.0	N/A	N/A
0	100.0 - 100.0	N/A	N/A
14	Overall	2.04	N/A

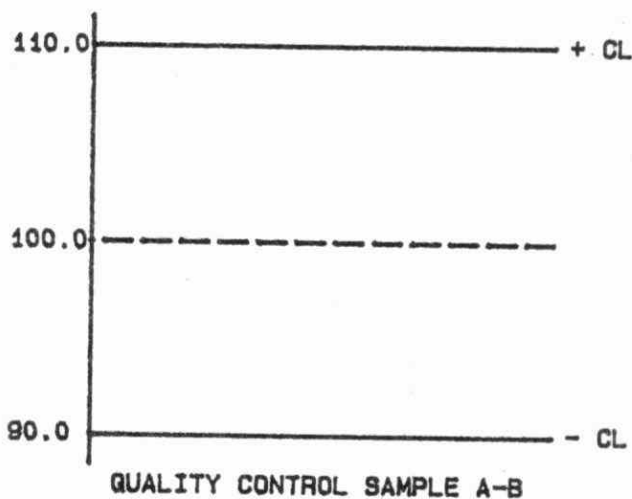
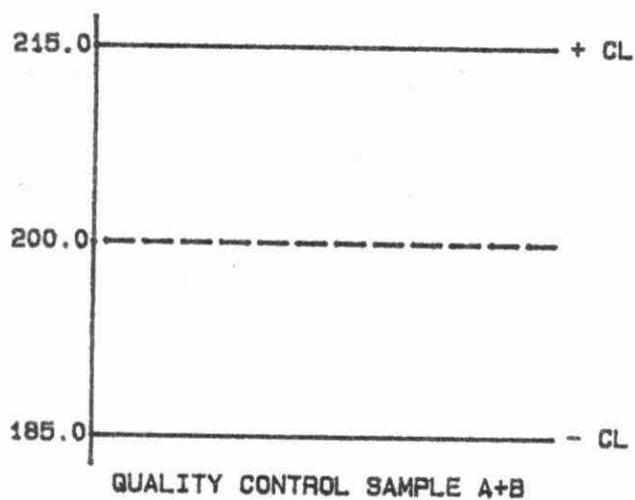
STANDARD DEVIATION (s.dupl): 2.06 W value: 2 T value: 10

OTHER CHECKS:

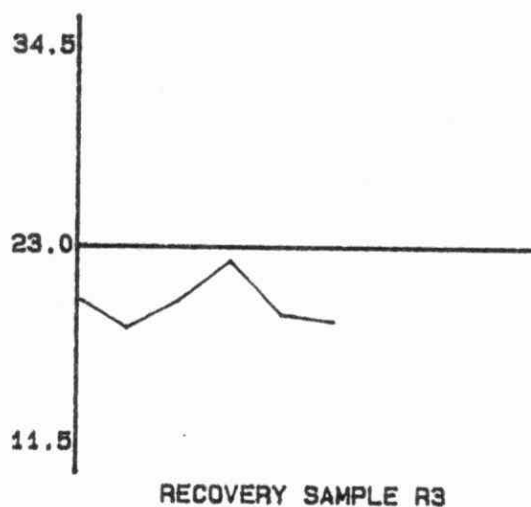
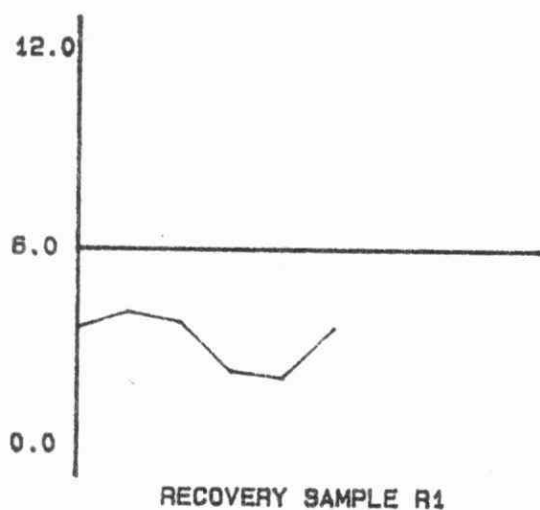
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	6	1.1	1.22

QUALITY CONTROL GRAPHS TOTAL LEAD - SOIL (UG/G AS PB)

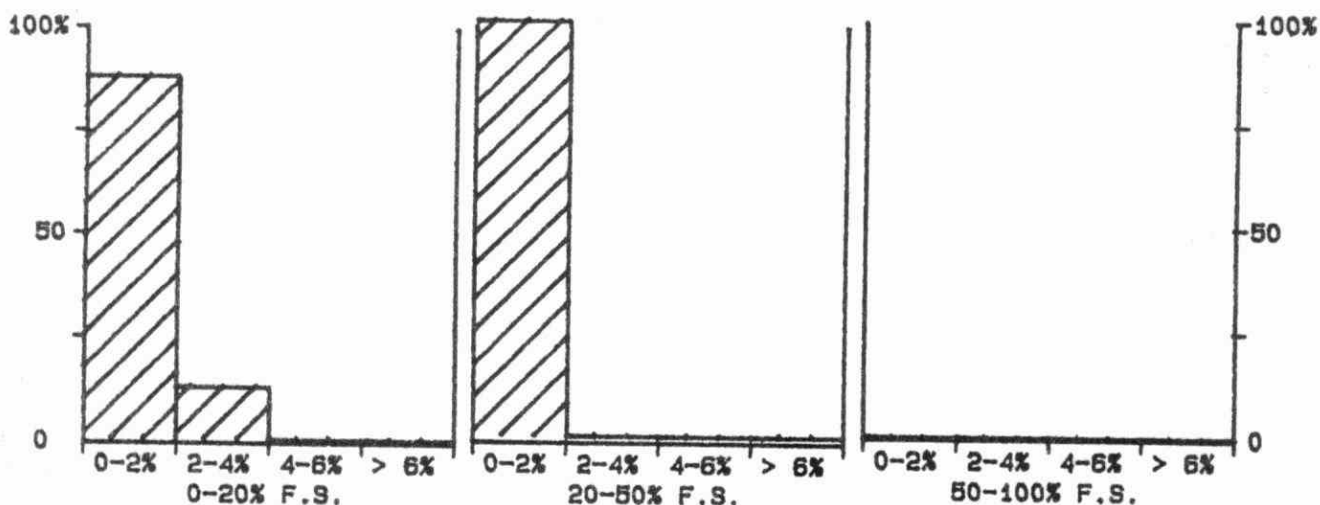
FROM: 22/08/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** LEAD ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	01/03/86
LIS Test Name Code:	PBUT	Units	: ug/L as Pb
Work Station Code	: DOASV	Unit Code	: 063882
Method Code	: 001PP2	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, and Precipitation			

SAMPLING:

Quantity Required: 100 mL
Container : 500 mL, acid washed Nalgene polypropylene container, bagged
in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.2% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when lead is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

EG & G (Princeton Applied Research) Model 384 Analyzer with Model 303 Hanging Mercury Drop Electrode Stand or Metrohm 646 VA Processor with Model 675 VA Sample Changer.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1** T value: 0.5

CALIBRATION:

B1 plus 3 standards daily

CONTROLS:

Calibration: LTB plus 2 standards, eg, QCA
Duplicate : End of every run (approx. every 15 samples)

LEAD - TOTAL
QUALITY CONTROL DATA FROM 07/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 0.5 to 2.00 ug/L as Pb

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	99	1.60	1.38	-0.22	0.348
b :	99	0.40	0.43	0.03	0.145
a+b :	99	2.00	1.81	-0.19	0.396
a-b :	99	1.20	0.96	-0.24	0.358

s.d.(AB): SW(within run): 0.253 S(between runs): 0.267 S/SW: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.10 to 2.90 for A+B
0.60 to 1.80 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
11	0.00 - 0.10	0.000	N/A
2	0.10 - 0.20	0.198	144.2
3	0.20 - 0.50	0.274	85.7
8	0.50 - 1.00	0.208	29.0
14	1.00 - 2.00	0.234	16.0
38	Overall	0.193	N/A

STANDARD DEVIATION (s.dupl): 0.000

W value: 0.1

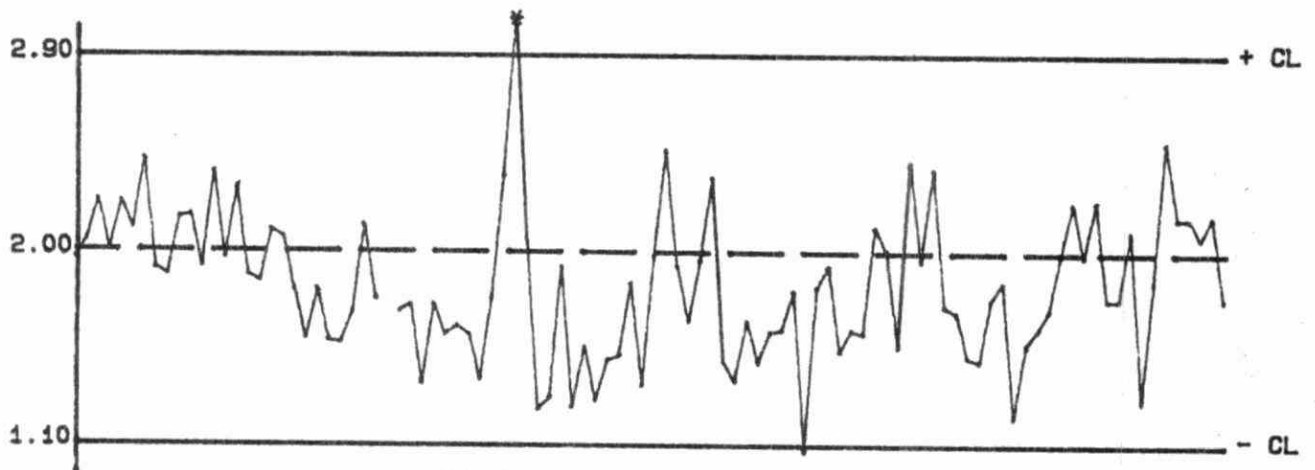
T value: 0.5

OTHER CHECKS:

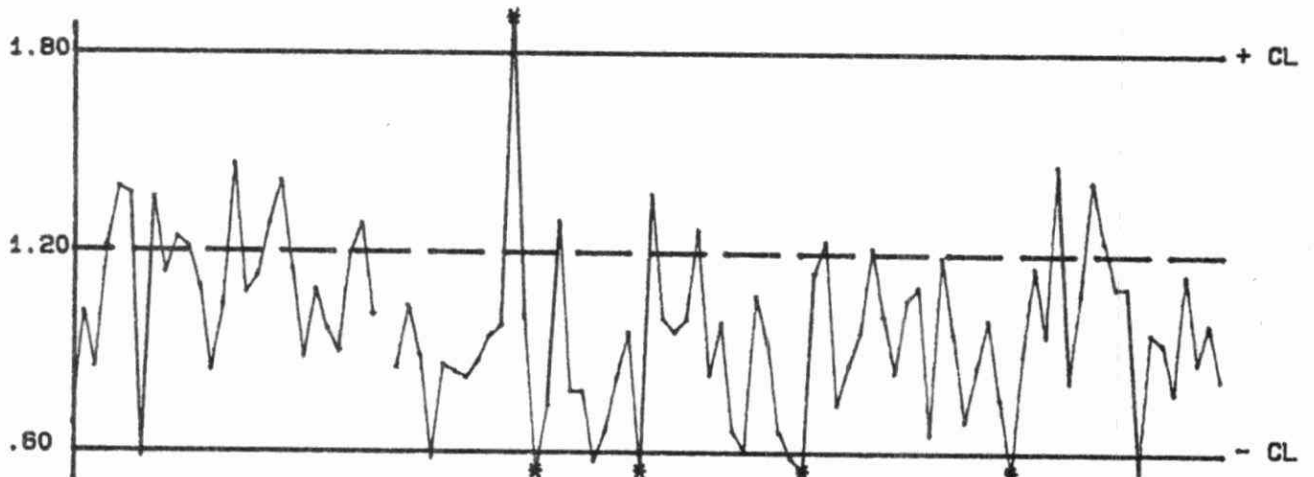
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	99	0.06	0.125

QUALITY CONTROL GRAPHS LEAD - TOTAL (UG/L AS PB)

FROM: 07/01/86
TO: 31/12/86

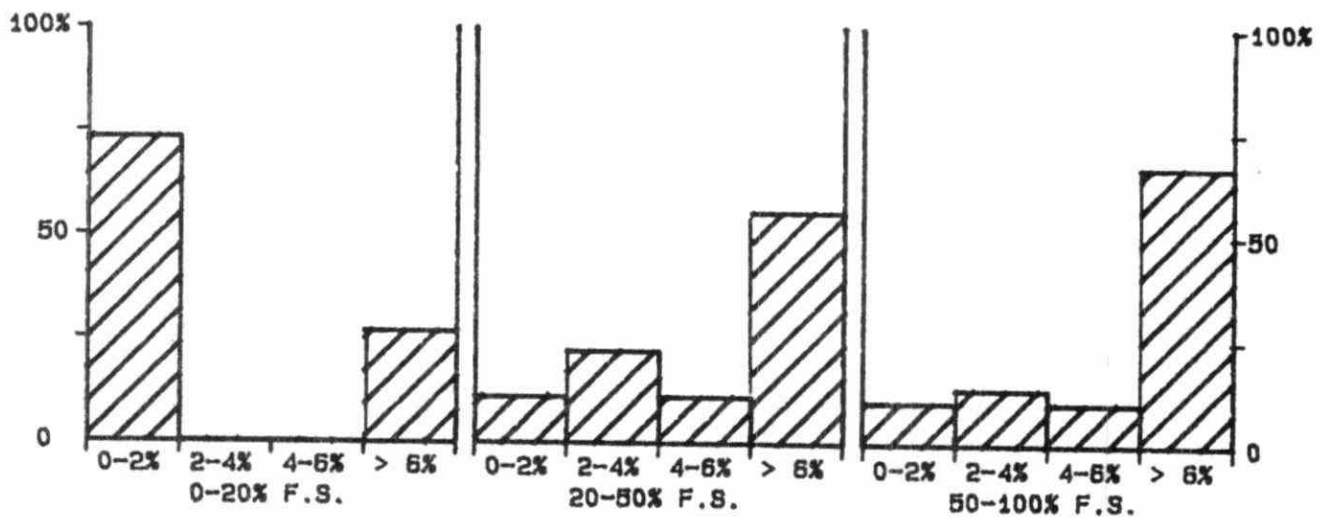


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 UG/L AS PB

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 18/05/79
LIS Test Name Code: MBUR Units : mg/L as Mg
Work Station Code : PRAA Unit Code : 064812
Method Code : 001CA1 Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow

SAMPLING:

Quantity Required: 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Samples are analysed by AAS at 285.2 nm with an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005** T value: 0.025

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

MAGNESIUM
QUALITY CONTROL DATA FROM 06/01/86 TO 22/12/86

Lab: Atomic Absorption

Analytical Range: 0.025 to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	69	0.300	0.305	0.005	0.0055
b :	69	0.050	0.055	0.005	0.0056
a+b :	69	0.350	0.360	0.010	0.0089
a-b :	69	0.250	0.250	-0.000	0.0066

s.d.(AB): Sw(within run): 0.0047 S(between runs): 0.0056 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

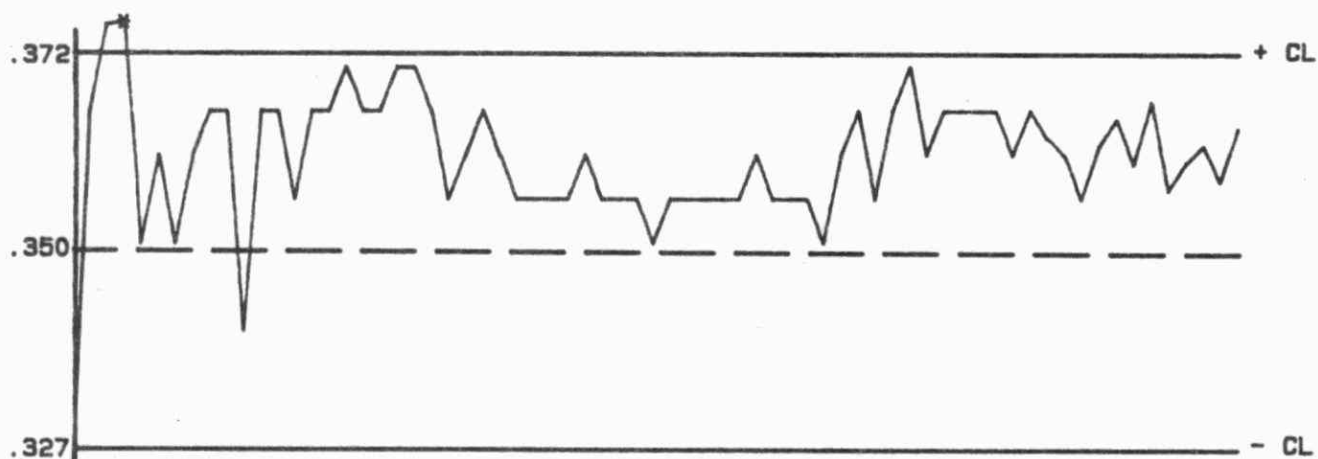
0.327 to 0.372 for A+B
0.235 to 0.265 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	125	0.000 - 0.050	0.0043	22.8
	32	0.050 - 0.100	0.0183	28.5
	21	0.100 - 0.250	0.0151	9.1
	7	0.250 - 0.500	0.0035	1.0
	185	Overall	0.0099	N/A

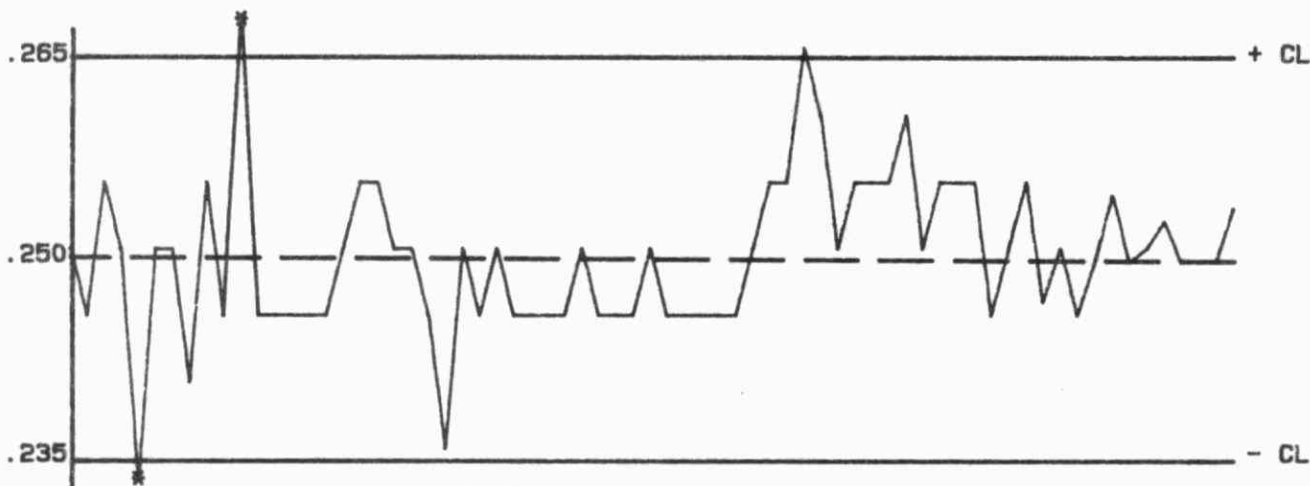
STANDARD DEVIATION (s.dup1): 0.0043 W value: 0.005 T value: 0.025

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 06/01/86
TO: 22/12/86

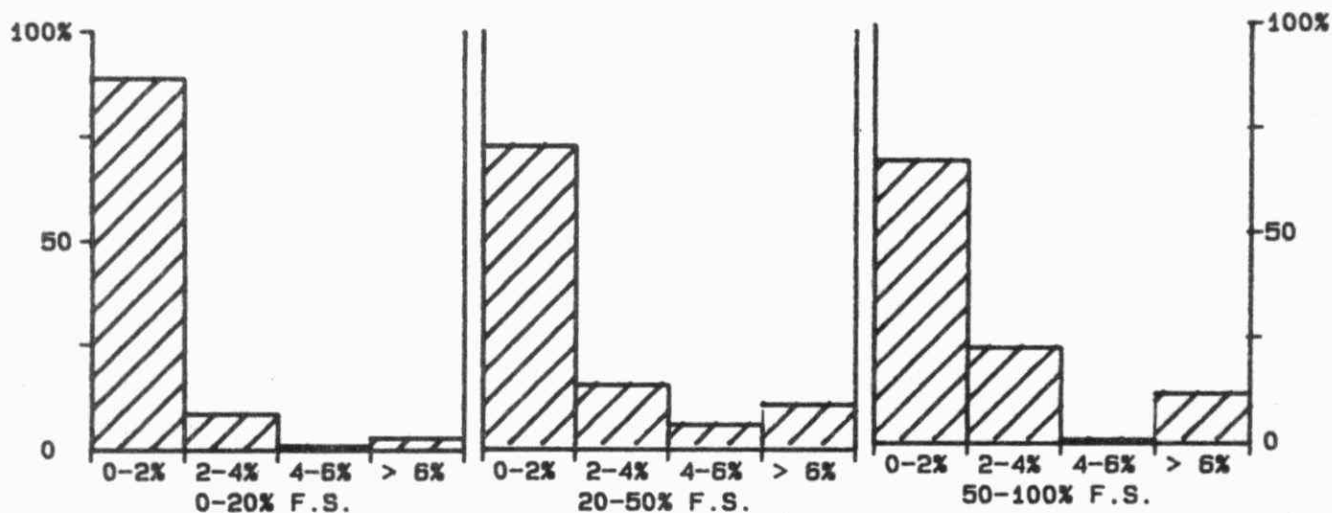


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .5 MG/L AS MG

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	01/04/74
LIS Test Name Code:	MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: F. Tomassini
Sample Type/Matrix:	Rivers, Lakes, Soil Extracts, Effluents.		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 1.16 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 5.00 mg/L full scale; second analytical range was dropped.

01/03/84 -Analytical range (RMCAMGH) was added; full scale: 1.00 mg/L. This range is currently restricted to special programs.

01/09/84 -Analytical range (RMCAMGH) was increased from 5.00 to 10.0 mg/L full scale. Calibration technique was changed from quadratic to linear interpolation. Calcium is no longer determined simultaneously.

25/09/85 -Calibration range became 7.0 mg/L full scale; second analytical range was dropped. Commodore PET microcomputer controlled system with sample flow injection introduced.

1985 -Three analytical ranges were used during 1985: 1.00, 7.00, and 10.0 mg/L as Mg full scale.

MAGNESIUM
QUALITY CONTROL DATA FROM 07/01/86 TO 19/12/86

Lab: Atomic Absorbtion

Analytical Range: 0.1 to 7.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	133	5.60	5.63	0.03	0.094
b :	134	0.49	0.49	0.00	0.013
a+b :	133	6.09	6.12	0.03	0.096
a-b :	133	5.11	5.14	0.03	0.093

s.d.(AB): Sw(within run): 0.066 S(between runs): 0.067 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77 to 6.40 for A+B
 4.90 to 5.32 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0.00 - 0.35	0.029	12.3
113	0.35 - 0.70	0.051	9.4
96	0.70 - 1.40	0.032	3.5
39	1.40 - 3.50	0.122	4.7
46	3.50 - 7.00	0.099	2.0
313	Overall	0.068	N/A

STANDARD DEVIATION (s.dupl): 0.029

W value: 0.02

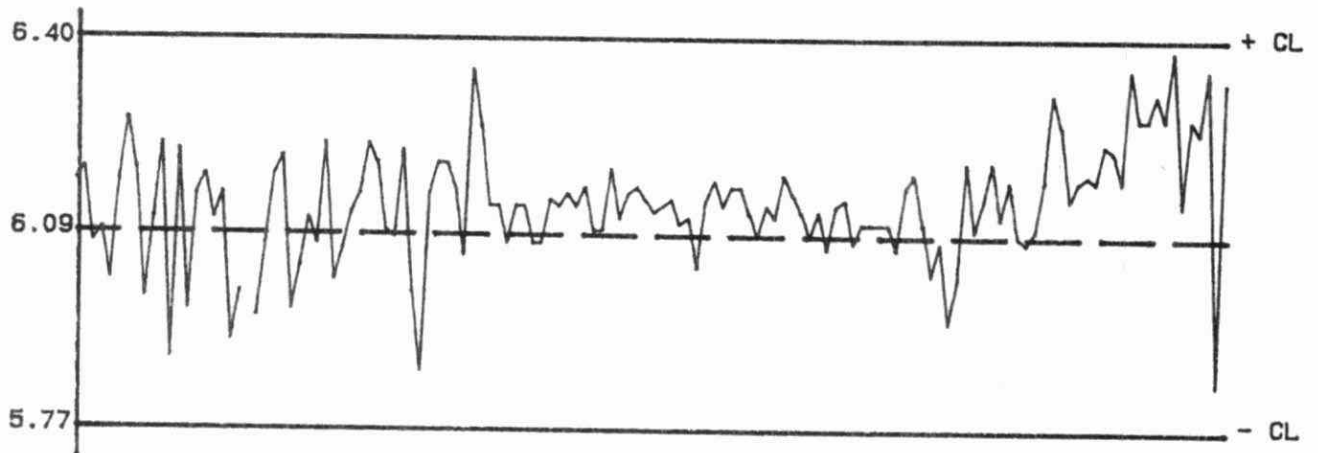
T value: 0.1

OTHER CHECKS:

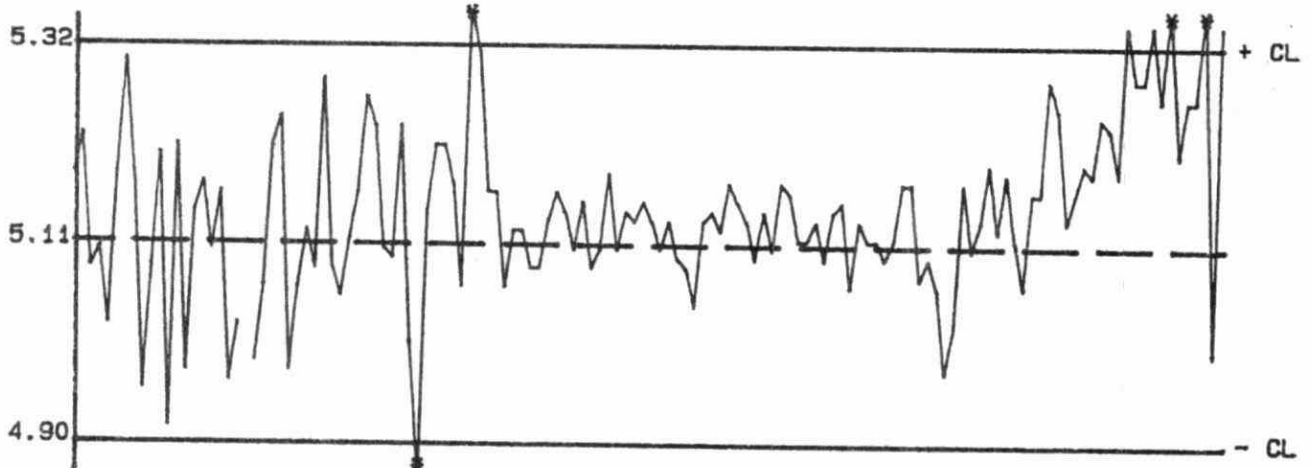
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	128	1.240	0.0807
Long Term Blank :	130	0.00	0.007

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 07/01/86
TO: 19/12/86

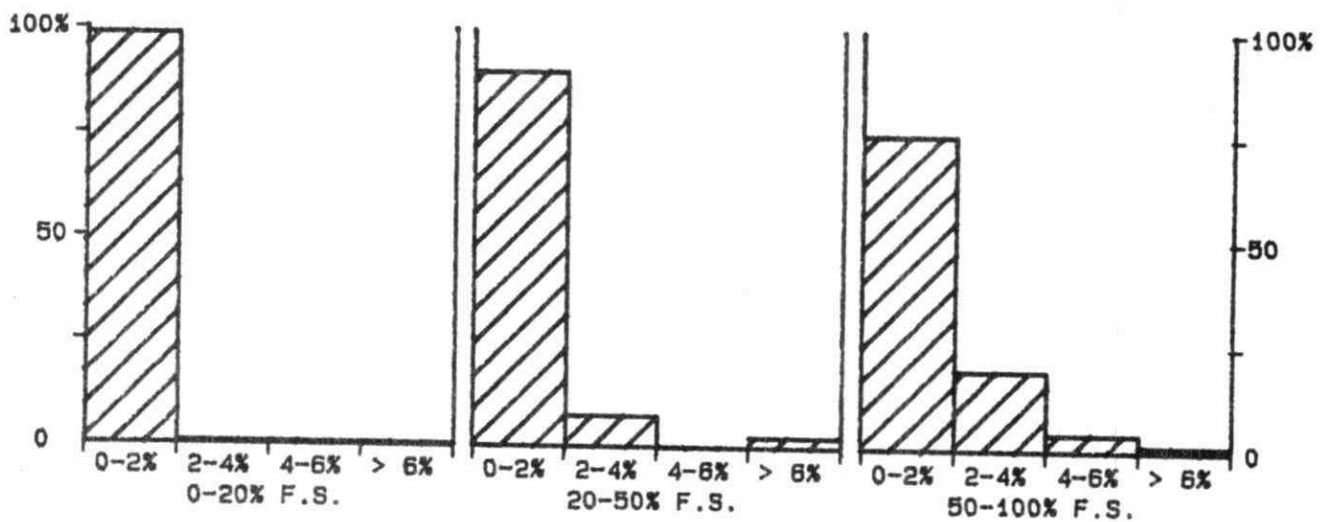


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 7 MG/L AS MG

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 08/04/86
LIS Test Name Code: MGUR Units : mg/L as Mg
Work Station Code : WAAS Unit Code : 064812
Method Code : 001CA1 Supervisor : F. Tomassini
Sample Type/Matrix: Domestic Waters, Leachates, Effluents

SAMPLING:

Quantity Required: 10 ml.
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.

Approximate absorbance: 1.187 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1** T value: 0.5

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/07/82 -The method introduced on this date differ slightly from Method B for magnesium in HAMES in that full scale was 20.0 mg/l; concentrations of QC standards were also adjusted.

08/04/86 -All sample classes moved to WAAS workstaion. Single analytical range changed from 80 to 35 mg/L as Mg. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

MAGNESIUM
QUALITY CONTROL DATA FROM 08/04/86 TO 31/12/86

Lab: Atomic Absorption

Analytical Range: 0.5 to 35.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	112	28.00	27.94	-0.06	0.520
b :	112	2.45	2.44	-0.01	0.098
a+b :	112	30.45	30.38	-0.07	0.546
a-b :	112	25.55	25.51	-0.04	0.512

s.d.(AB): Sw(within run): 0.362 S(between runs): 0.374 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

28.87 to 32.02 for A+B
 24.50 to 26.60 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	22	0.00 - 1.75	0.064	8.0
	18	1.75 - 3.50	0.095	3.4
	30	3.50 - 7.00	0.151	2.8
	114	7.00 - 17.50	0.244	2.2
	77	17.50 - 35.00	0.457	1.8
	261	Overall	0.302	N/A

STANDARD DEVIATION (s.dup1): 0.064

W value: 0.1

T value: 0.5

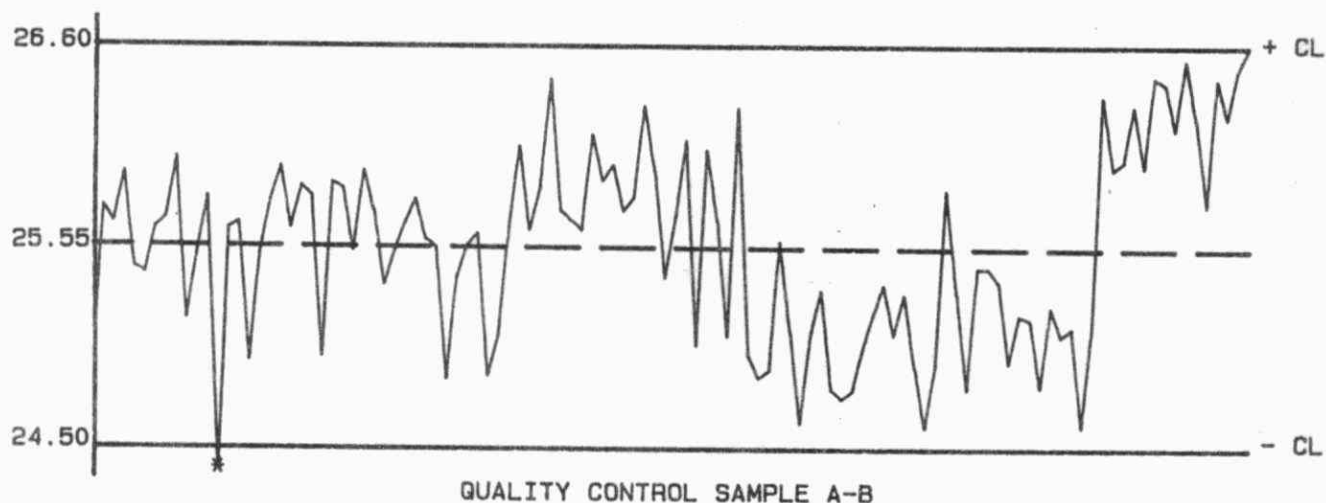
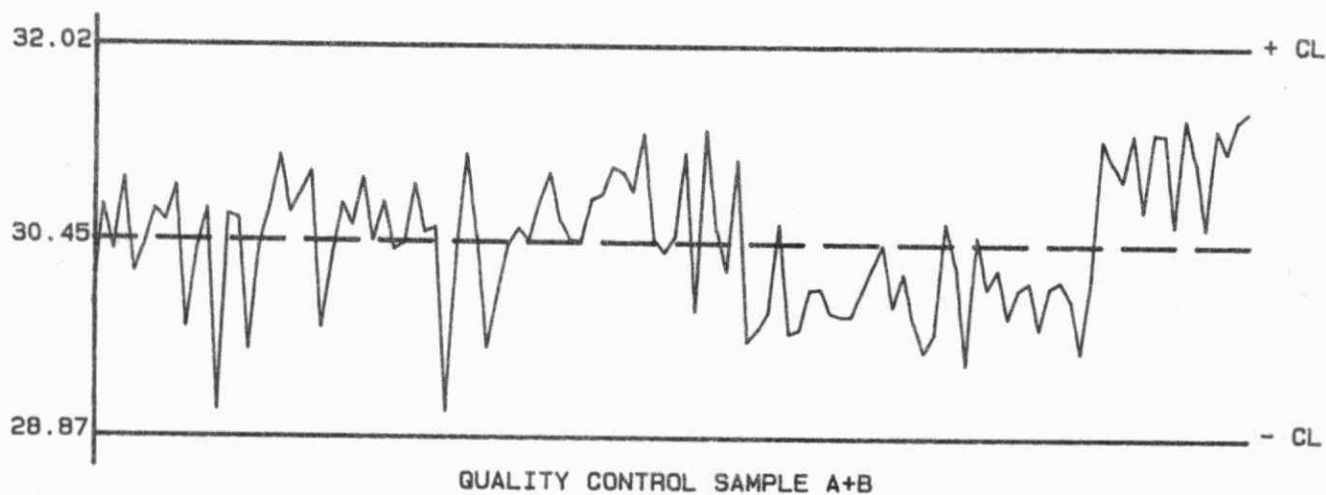
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	76	1.116	0.1059
Long Term Blank :	112	-0.00	0.078

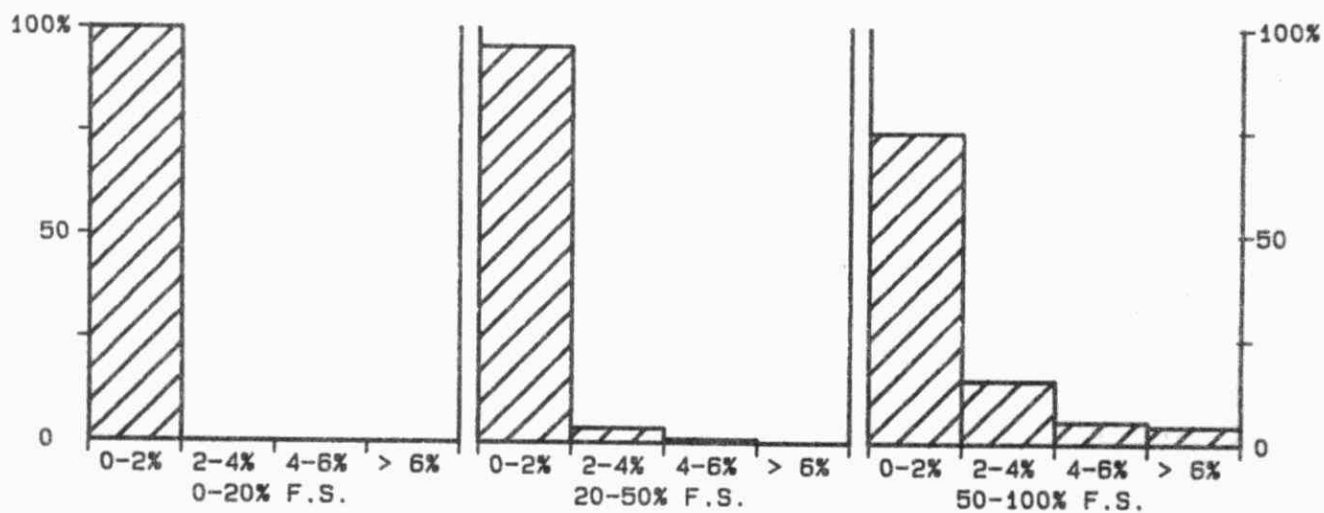
QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 08/04/86

TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 35 MG/L AS MG

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory : Domestic Water Method Introduced: 01/07/82
LIS Test Name Code: MGUR Units : mg/L as Mg
Work Station Code : WCAMGH Unit Code : 064812
Method Code : 001AA1 Supervisor : P. Campbell
Sample Type/Matrix: Domestic Waters, Leachates, Effluents

SAMPLING:

Quantity Required: 100 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Acidified lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.15 at the full scale level.

INSTRUMENTATION:

Automated modular continuous flow atomic absorption system (AAS). Two analytical ranges are obtained from the output of the AAS.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 3 standards

MODIFICATIONS:

01/07/82 -The method introduced on this date differed slightly from Method B for magnesium in HAMES in that full scale was 20.0 mg/L; concentrations of QC standards were also adjusted.

08/04/86 -THIS TEST WAS ASSIGNED TO THE WAAS WORKSTATION.

MAGNESIUM
QUALITY CONTROL DATA FROM 02/01/86 TO 10/03/86

Lab: Domestic Water

Analytical Range: 0.5 to 80.0 mg/l as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	27	52.0	53.3	1.3	0.53
b :	27	13.0	13.3	0.3	0.25
a+b :	27	65.0	66.6	1.6	0.60
a-b :	27	39.0	40.0	1.0	0.56
c :	27	13.0	13.2	0.2	0.13
d :	27	2.6	2.7	0.1	0.06
c+d :	27	15.6	15.9	0.3	0.18
c-d :	27	10.4	10.6	0.2	0.11

s.d.(AB): Sw(within run): 0.40 S(between runs): 0.41 S/Sw: 1.05
s.d.(CD): Sw(within run): 0.08 S(between runs): 0.10 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

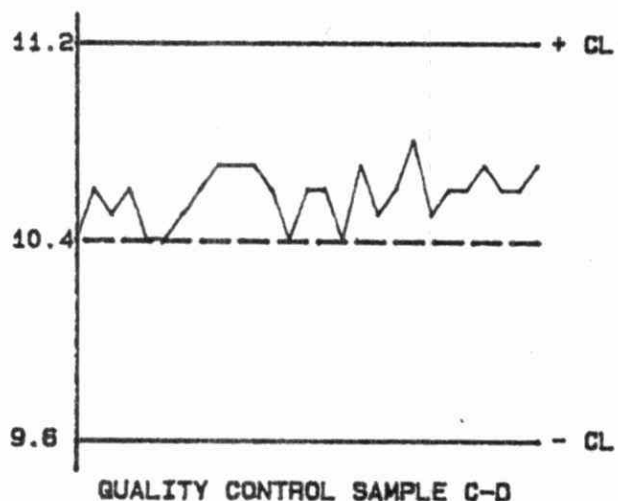
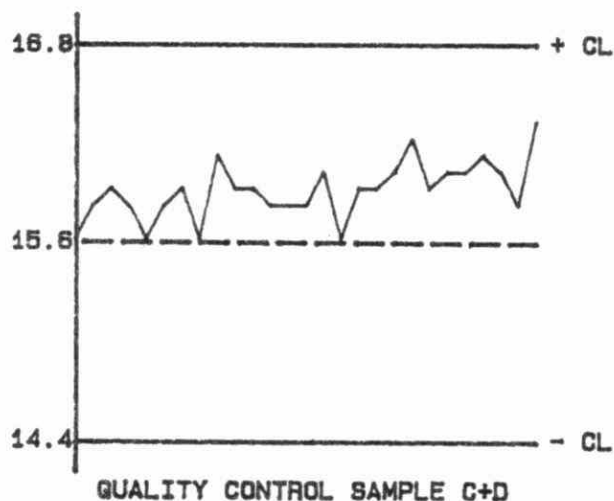
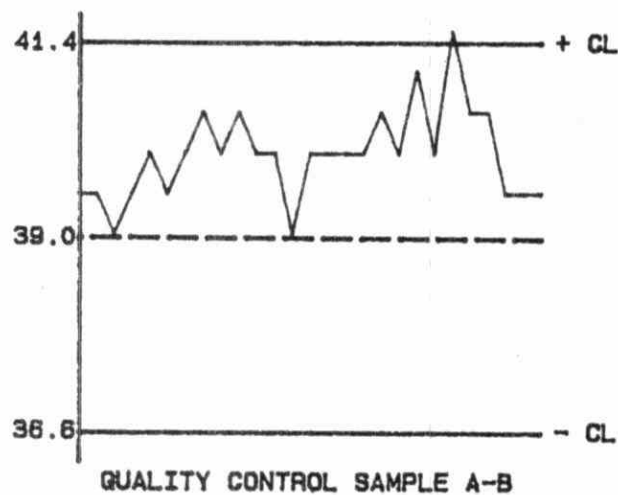
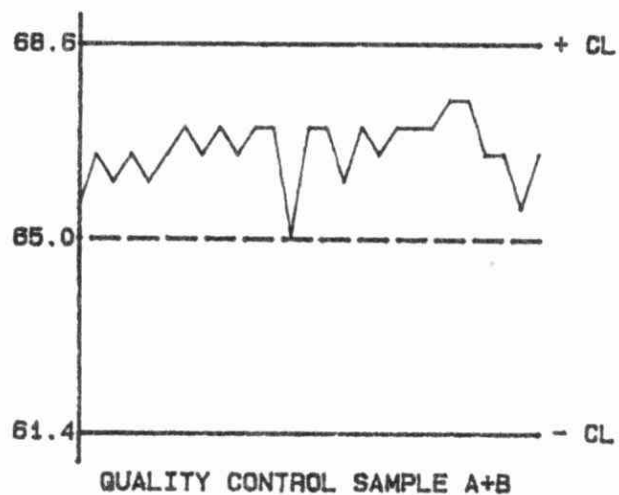
61.4 to 68.6 for A+B
36.6 to 41.4 for A-B
14.4 to 16.8 for C+D
9.6 to 11.2 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	14	0.0 - 4.0	0.12	10.1
	28	4.0 - 10.0	0.11	1.4
	13	10.0 - 20.0	0.16	0.9
	10	20.0 - 40.0	0.22	0.8
	5	40.0 - 80.0	0.27	0.6
	70	Overall	0.16	N/A

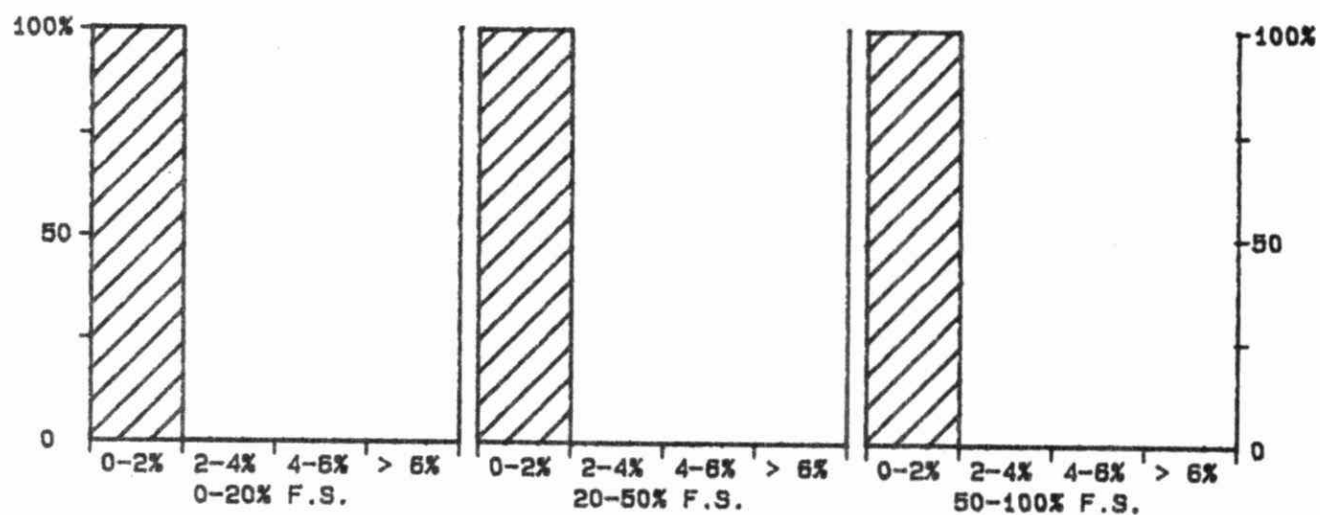
STANDARD DEVIATION (s.dupl): 0.12 W value: 0.1 T value: 0.5

QUALITY CONTROL GRAPHS MAGNESIUM (MG/L AS MG)

FROM: 02/01/86
TO: 10/03/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** MAGNESIUM - SOIL (Xsc) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	MGESC	Units	: meq/100g Mg
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 6 g (dry <2 mm).
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for Mg by AAS at 285.2 with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. Aluminum, calcium, and potassium are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -3g sample used for all soil types (6g previously used for sandy soils)
01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown--average value used.

MAGNESIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 01/10/86 TO 30/12/86

Lab: Dorset Soils

Analytical Range: 0.05 to 2.50 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	1.88	N/A	N/A	N/A
b :	0	0.63	N/A	N/A	N/A
a+b :	0	2.50	N/A	N/A	N/A
a-b :	0	1.25	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31 to 2.69 for A+B
 1.13 to 1.37 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	14	0.05	0.05	0.020
r2 :	14	2.28	2.28	0.334
r3 :	14	0.29	0.29	0.047

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
27	0.00 - 0.50	0.017	11.4
19	0.50 - 1.25	0.049	5.9
7	1.25 - 2.50	0.094	5.4
53	Overall	0.047	N/A

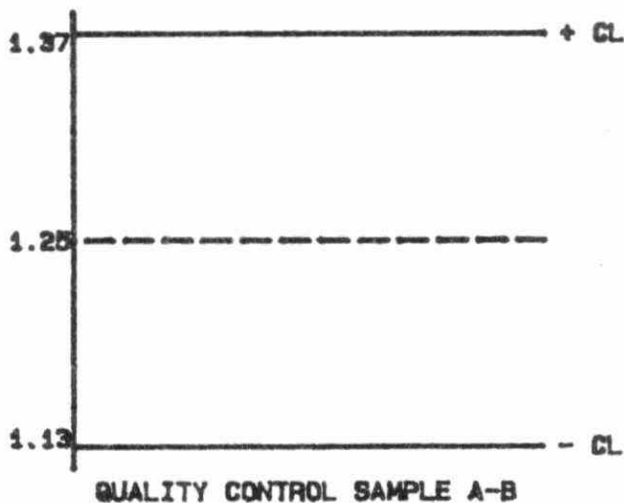
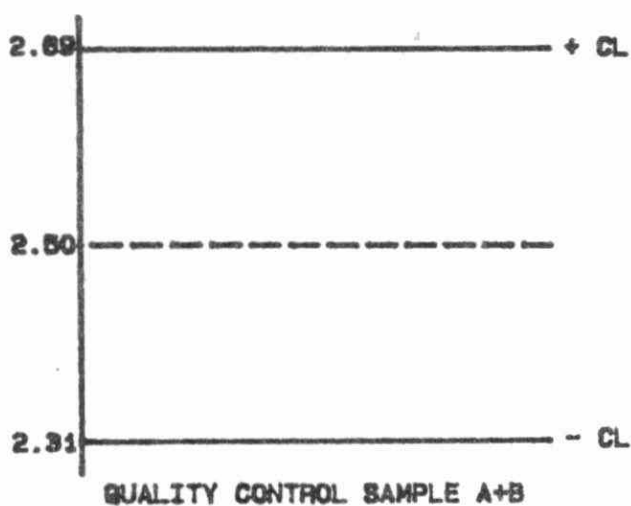
STANDARD DEVIATION (s.dupl): 0.017 W value: 0.01 T value: 0.05

OTHER CHECKS:

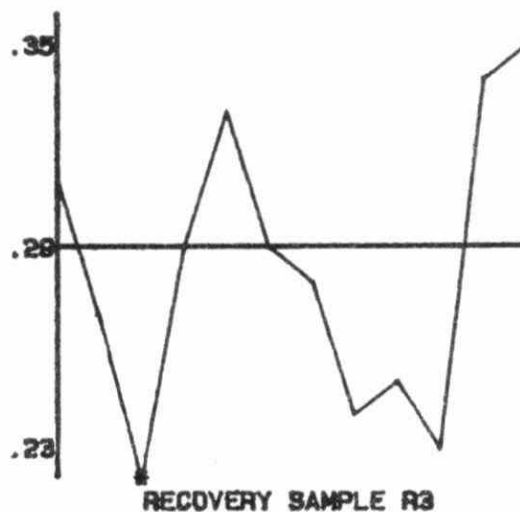
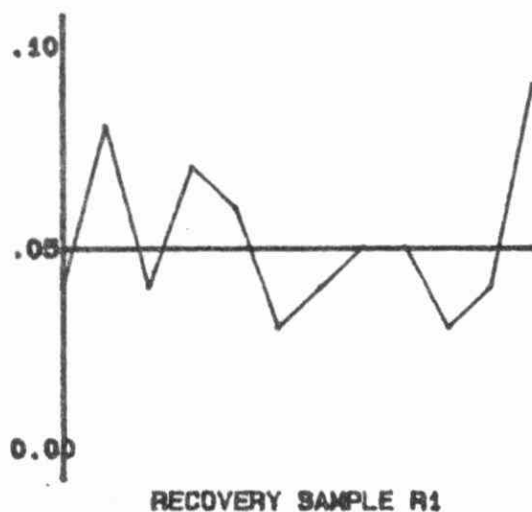
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Digested Blank :	14	0.01	0.018

QUALITY CONTROL GRAPHS MAGNESIUM - SOIL (XSC) (MEQ/100G)

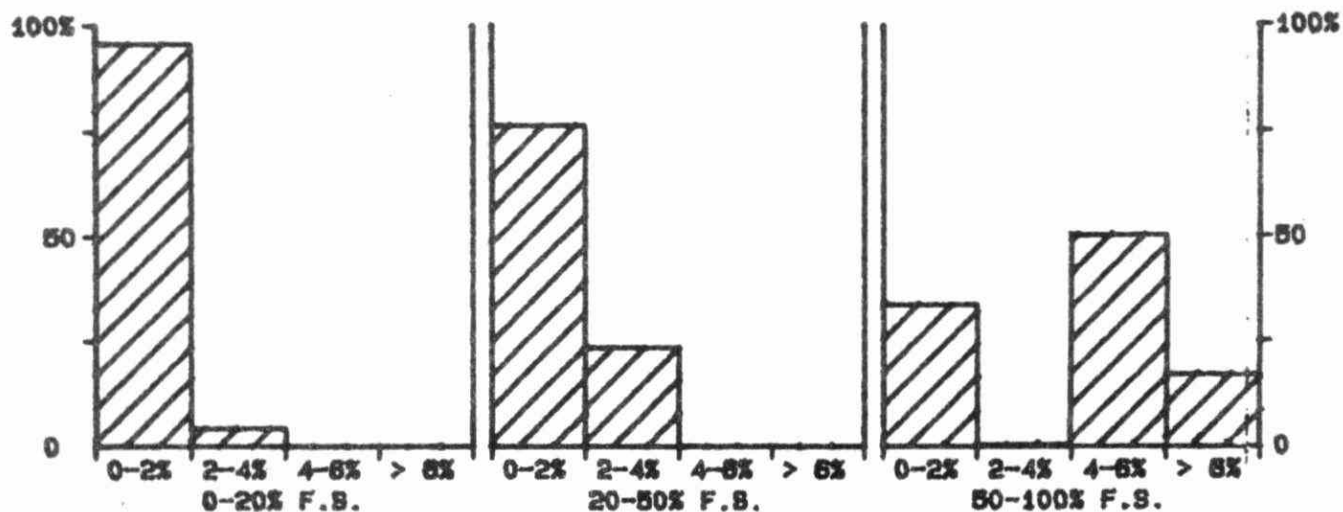
FROM: 01/10/88
TO: 12/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** TOTAL NICKEL - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	NIUT	Units	: ug/g as Ni
Work Station Code	: DOHMT	Unit Code	: 073828
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 1 g (dry <150 um).
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample (air dried and grounded) plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125 C for 2 hours. The temperature is increased to 175 C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Ni by AAS at 232.0 nm using an air-acetylene flame. Approximate absorbance: 0.2 at the full scale value. Copper, lead and zinc are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 1 T value: 5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples.
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160 C to 175 C
06/01/86 -Samples analyzed on Varian 1275AAS (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values of recoveries are unknown--average values used.

TOTAL NICKEL - SOIL
QUALITY CONTROL DATA FROM 22/08/86 TO 31/12/86

Lab: Dorset Soils

Analytical Range: 5 to 200.0 ug/g as Ni

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a	0	150.0	N/A	N/A	N/A
b	0	50.0	N/A	N/A	N/A
a+b	0	200.0	N/A	N/A	N/A
a-b	0	100.0	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

170.0 to 230.0 for A+B
80.0 to 120.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1	5	9.3	8.1	1.06
r2	5	28.5	28.2	2.00
r3	5	6.8	5.8	0.93

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
13	0.0 - 50.0	1.66	11.0
0	50.0 - 100.0	N/A	N/A
0	100.0 - 200.0	N/A	N/A
13	Overall	1.66	N/A

STANDARD DEVIATION (s.dupl): 1.66

W value: 1

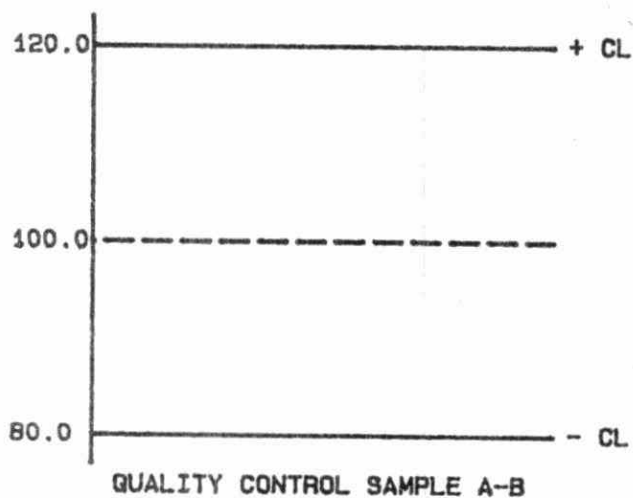
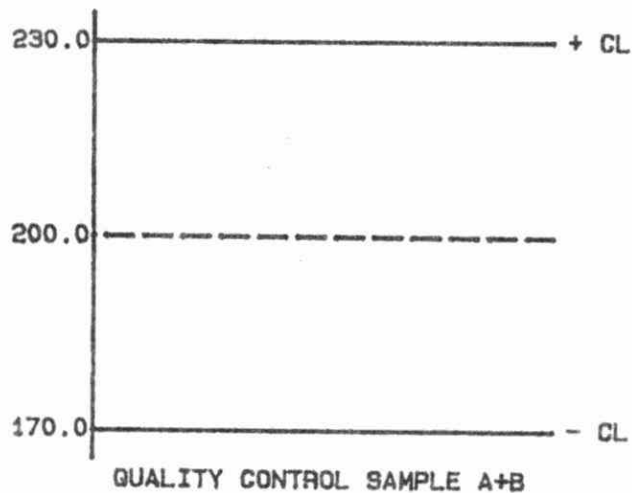
T value: 5

OTHER CHECKS:

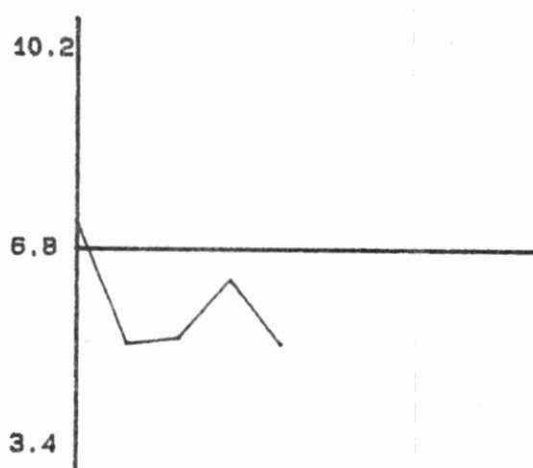
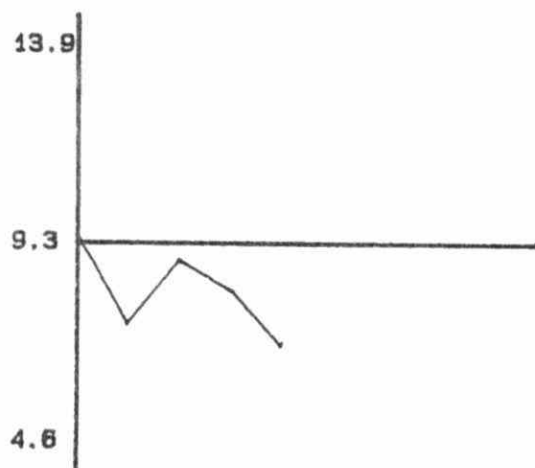
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank	5	0.3	0.87

QUALITY CONTROL GRAPHS TOTAL NICKEL - SOIL (UG/G AS NI)

FROM: 22/08/86
TO: 31/12/86



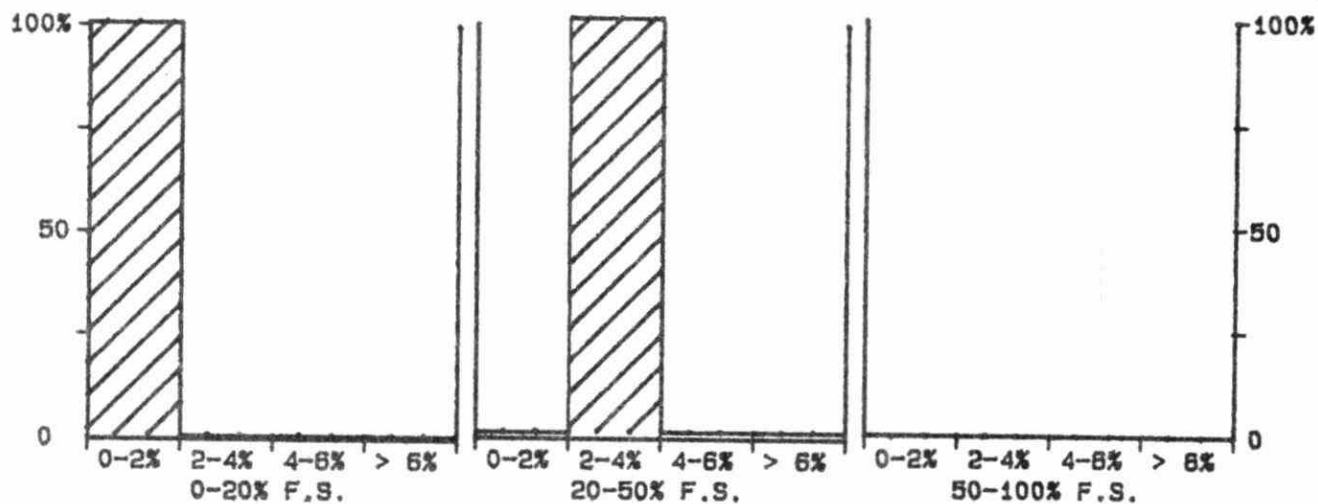
--- EXPECTED VALUE
— CONTROL LIMIT (CL)



RECOVERY SAMPLE R1

RECOVERY SAMPLE R3

* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 UG/G AS NI

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/05/84
LIS Test Name Code:	NNHTFR, NNHTUR	Units	: mg/L as N
Work Station Code	: PRNUT	Unit Code	: 064807
Method Code	: 103CC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Precipitation, Throughfall, Stemflow			

SAMPLING:

Quantity Required: 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.
Approximate absorbance : 0.7 at full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37 C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.005** T value: 0.025

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 3 standards every 10 samples

MODIFICATIONS:

01/05/84 -The procedure introduced on this date is the same as Method A for nitrogen-ammonia in HAMES except that the samples are not filtered and the full scale concentration is 5.00 mg/L as N.

NITROGEN - AMMONIA PLUS AMMONIUM
QUALITY CONTROL DATA FROM 06/01/86 TO 19/12/86

Lab: Colourimetry

Analytical Range: 0.025 to 5.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	64	4.00	3.98	-0.02	0.030
b :	64	0.80	0.81	0.01	0.015
a+b :	64	4.80	4.79	-0.01	0.036
a-b :	64	3.20	3.17	-0.03	0.031
c :	64	0.800	0.801	0.001	0.0080
d :	64	0.200	0.200	-0.000	0.0025
c+d :	64	1.000	1.001	0.001	0.0096
c-d :	64	0.600	0.601	0.001	0.0070

s.d.(AB): SW(within run): 0.022 S(between runs): 0.024 S/SW: 1.08
s.d.(CD): SW(within run): 0.0049 S(between runs): 0.0059 S/SW: 1.20

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.69 to 4.91 for A+B
3.13 to 3.28 for A-B
0.840 to 1.060 for C+D
0.560 to 0.640 for C-D

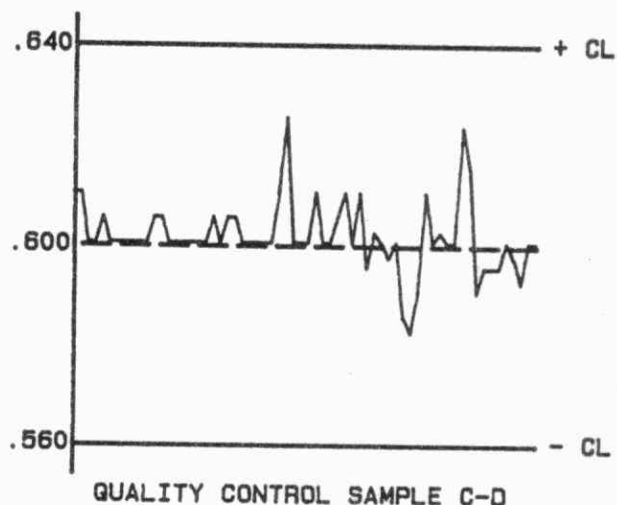
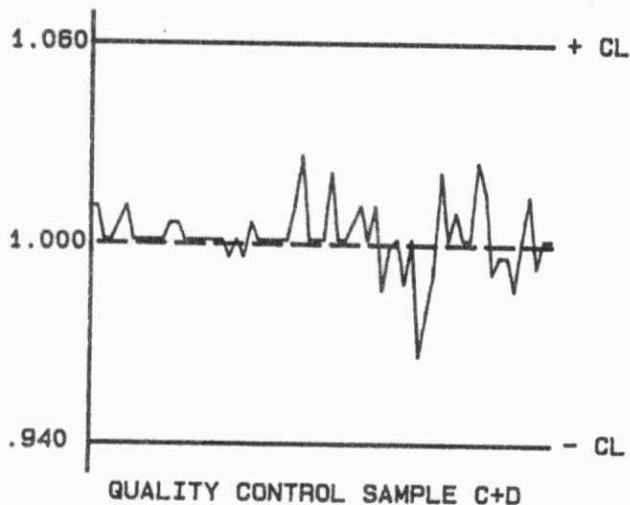
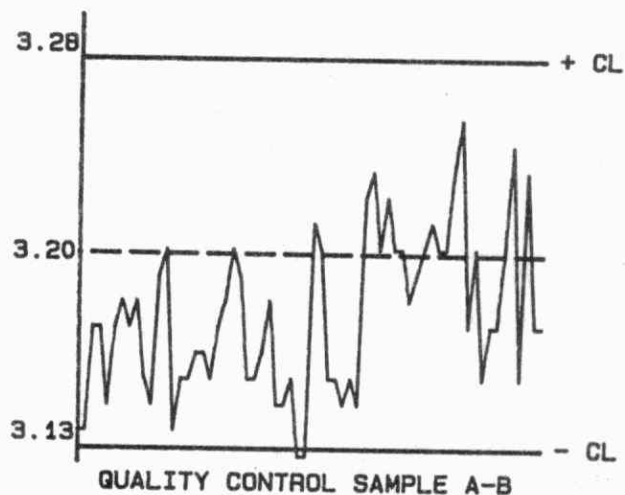
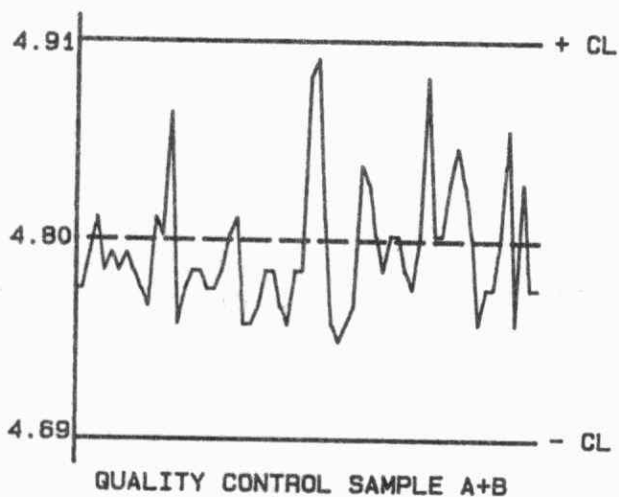
DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	50	0.000 - 0.100	0.0019	5.9
	87	0.100 - 0.500	0.0044	1.3
	31	0.500 - 1.000	0.0071	1.0
	18	1.00 - 5.00	0.085	5.0
	186	Overall	0.027	N/A

STANDARD DEVIATION (s.dupl): 0.0019 W value: 0.005 T value: 0.025

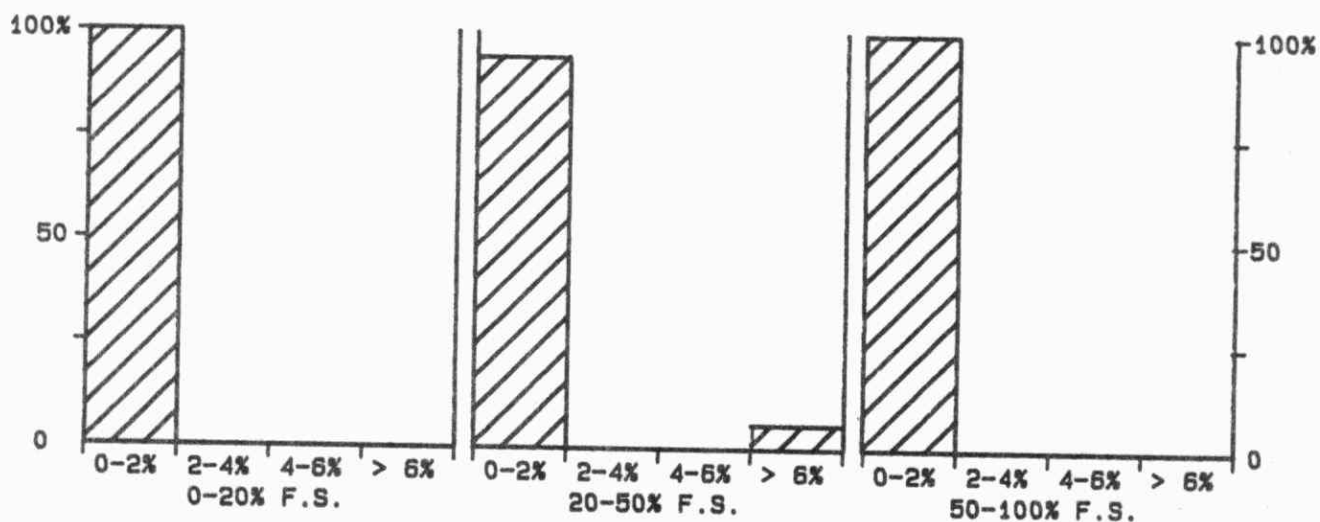
OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	64	0.003	0.0025

QUALITY CONTROL GRAPHS NITROGEN - AMMONIA PLUS AMMONIUM (MG/L AS N)

FROM: 06/01/86
TO: 19/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 5 MG/L AS N

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/78
LIS Test Name Code:	NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Soil Extracts, Effluents.			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance : 0.5 at the full scale level.

N.B. Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37 C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA

Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).

15/05/84 -Commadore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP9820 microcomputer introduced to replace Commadore PET.

NITROGEN-AMMONIA PLUS AMMONIUM
QUALITY CONTROL DATA FROM 01/03/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 0.01 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	146	1.60	1.62	0.02	0.015
b :	146	0.40	0.40	0.00	0.007
a+b :	146	2.00	2.02	0.02	0.018
a-b :	146	1.20	1.22	0.02	0.015
c :	146	0.400	0.403	0.003	0.0065
d :	146	0.200	0.208	0.008	0.0052
c+d :	146	0.600	0.611	0.011	0.0099
c-d :	146	0.200	0.195	-0.005	0.0064

s.d.(AB): Sw(within run): 0.011 S(between runs): 0.012 S/Sw: 1.10
s.d.(CD): Sw(within run): 0.0045 S(between runs): 0.0059 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.91 to 2.09 for A+B
1.14 to 1.26 for A-B
0.570 to 0.630 for C+D
0.180 to 0.220 for C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
235	0.000 - 0.040	0.0026	15.1
115	0.040 - 0.100	0.0042	6.9
28	0.100 - 0.200	0.0076	5.6
30	0.200 - 0.400	0.0094	3.2
20	0.40 - 2.00	0.010	0.8
428	Overall	0.005	N/A

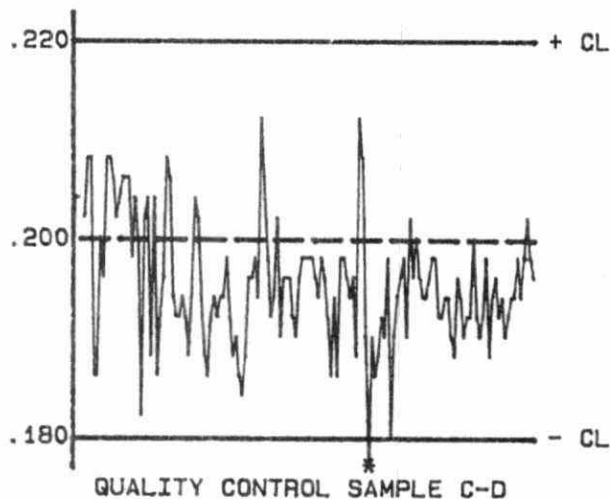
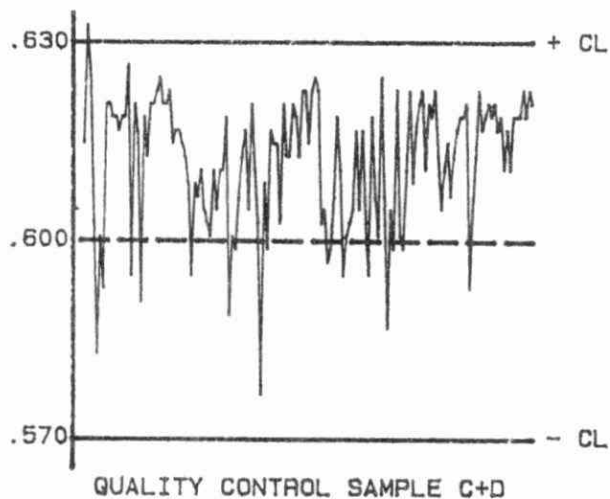
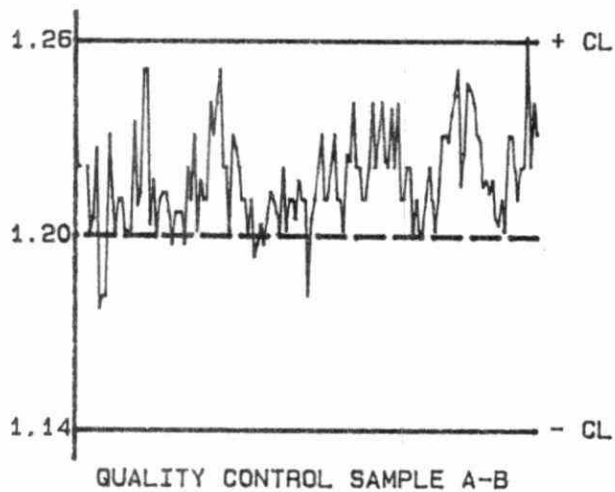
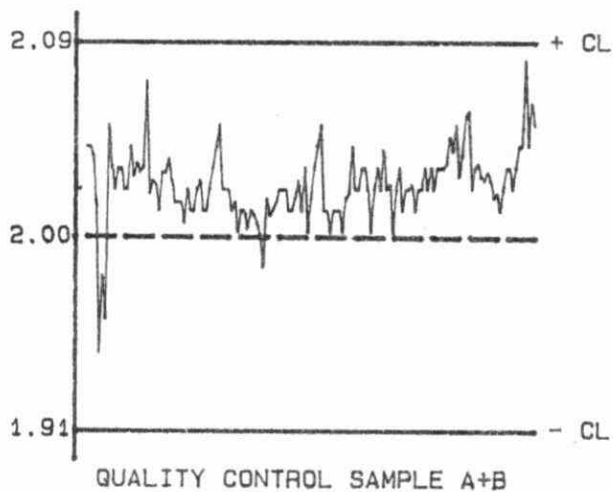
STANDARD DEVIATION (s.dup1): 0.0026 W value: 0.002 T value: 0.01

OTHER CHECKS:

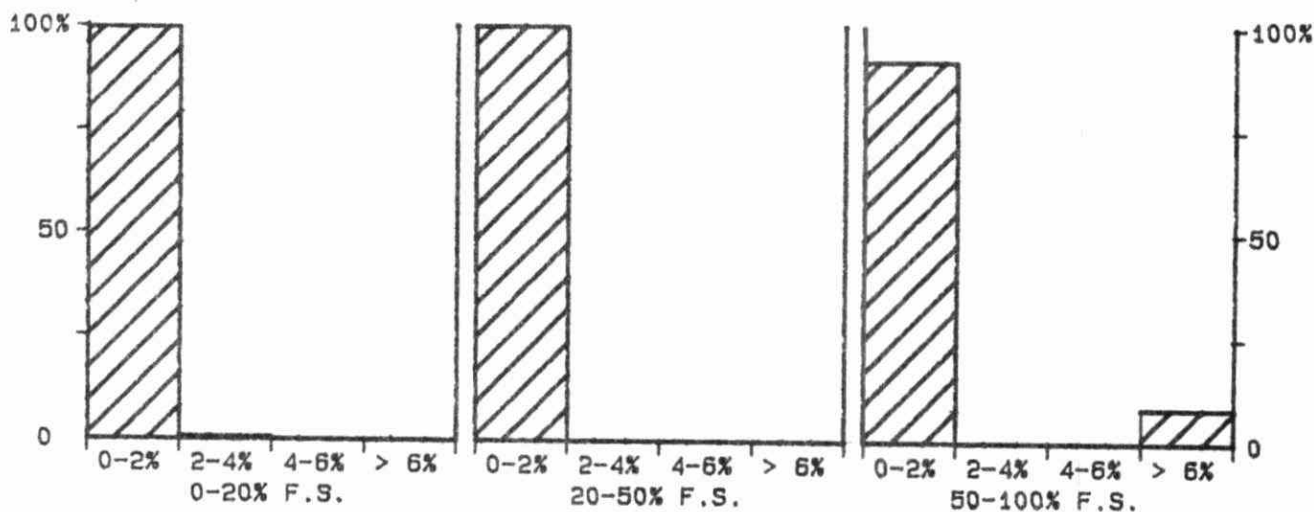
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	146	0.004	0.0061

QUALITY CONTROL GRAPHS NITROGEN-AMMONIA PLUS AMMONIUM (MG/L AS N)

FROM: 01/03/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/77
LIS Test Name Code:	NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Sample Type/Matrix:	Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.7 at the full scale level.

N.B. Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 37 C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA

Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

02/07/85 -Sample filtration for all samples classes was eliminated.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration was changed from linear interpolation to quadratic using 6 standards instead of 2. One analytical range is now used.

NITROGEN - AMMONIA PLUS AMMONIUM
QUALITY CONTROL DATA FROM 03/01/86 TO 16/12/86

Lab: Colourimetry

Analytical Range: 0.5 to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	143	35.0	35.6	0.6	0.37
b :	143	14.0	14.3	0.3	0.20
a+b :	143	49.0	49.9	0.9	0.49
a-b :	143	21.0	21.4	0.4	0.33
c :	143	14.00	14.23	0.23	0.174
d :	143	3.50	3.48	-0.02	0.124
c+d :	143	17.50	17.72	0.22	0.251
c-d :	143	10.50	10.75	0.25	0.169

s.d.(AB): Sw(within run): 0.23 S(between runs): 0.30 S/Sw: 1.27
s.d.(CD): Sw(within run): 0.120 S(between runs): 0.151 S/Sw: 1.26

On any given day the calibration is accepted if the values obtained lie within the ranges:

46.8 to 51.2 for A+B
19.5 to 22.5 for A-B
16.30 to 18.70 for C+D
9.70 to 11.30 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	184	0.00 - 2.00	0.190	76.6
	27	2.00 - 5.00	0.852	25.9
	15	5.00 - 10.00	0.152	1.9
	37	10.0 - 20.0	1.66	11.3
	17	20.0 - 50.0	0.46	1.6
	280	Overall	0.69	N/A

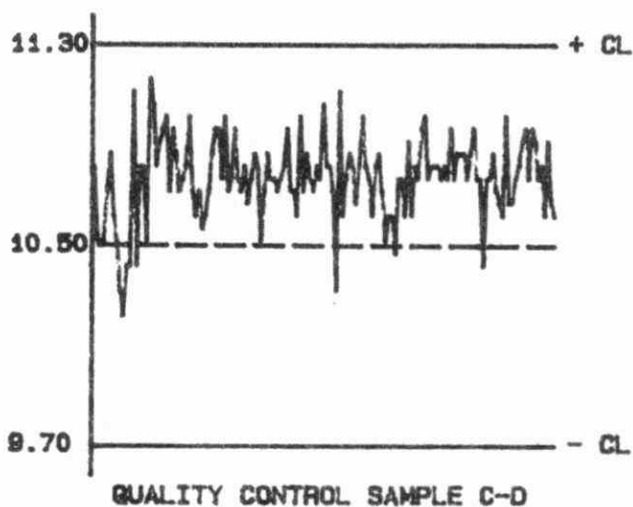
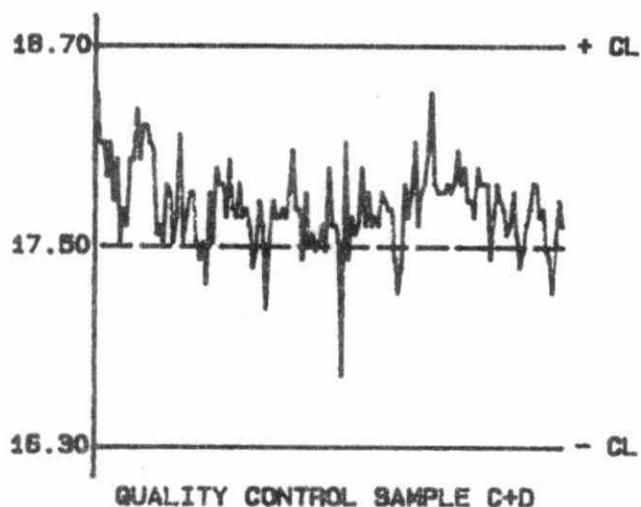
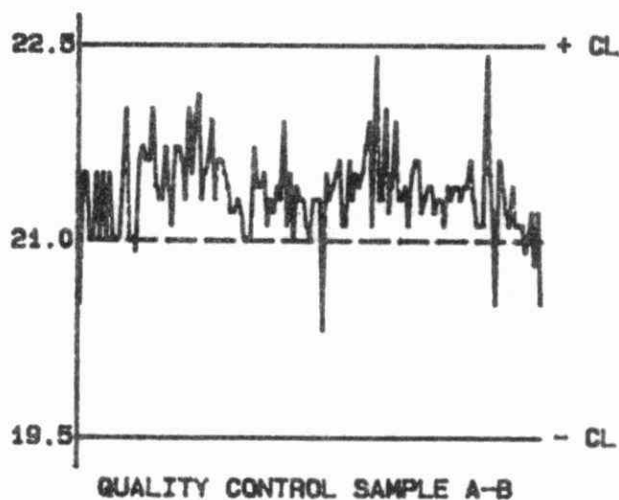
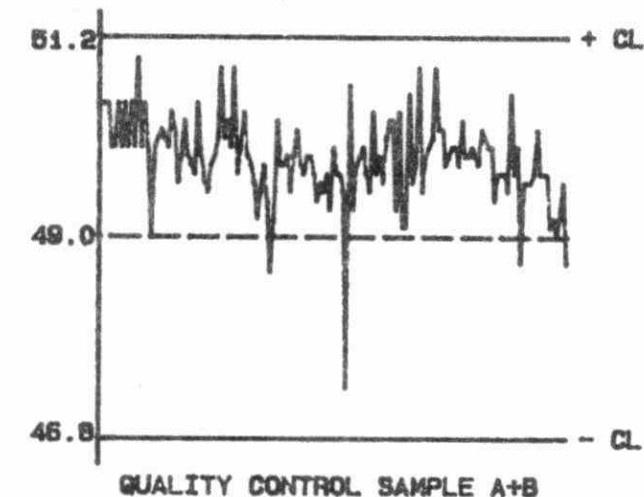
STANDARD DEVIATION (s.dup1): 0.190 W value: 0.1 T value: 0.5

OTHER CHECKS:

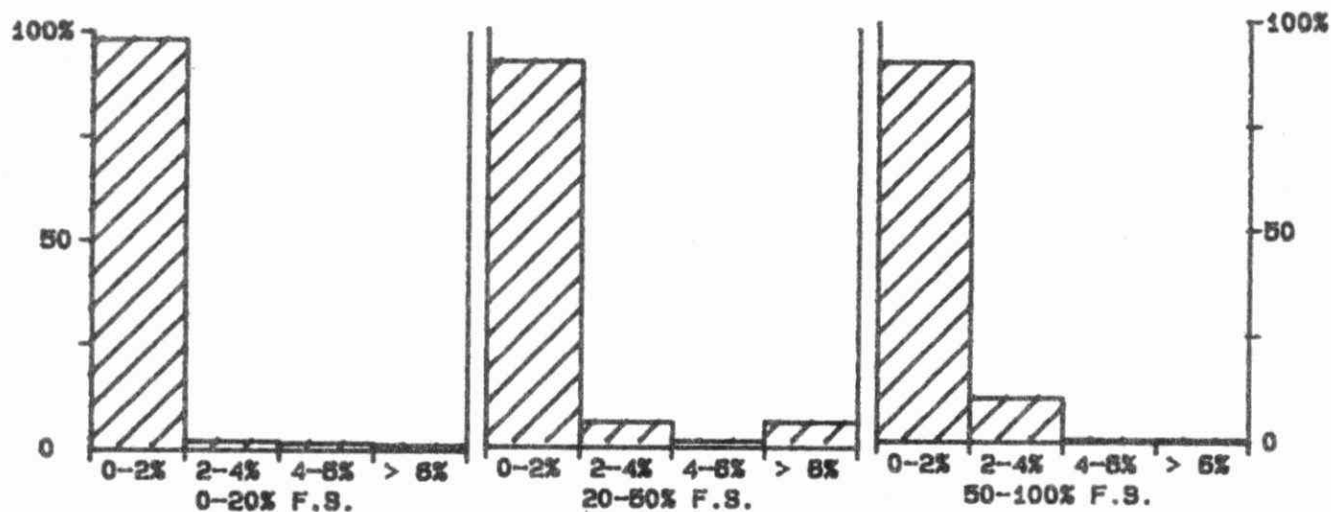
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	9	540	42.6
Long Term Blank :	142	0.01	0.061

QUALITY CONTROL GRAPHS NITROGEN - AMMONIA PLUS AMMONIUM (MG/L AS N)

FROM: 03/01/86
TO: 16/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS N

*** NITROGEN-AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	01/06/76
LIS Test Name Code:	NNHTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation			

SAMPLING:

Quantity Required: 50 mL
Container : Plastic (polystyrene)

SAMPLE PREPARATION:

No sample preparation needed.

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance : 0.40 at the full scale level.

N.B. Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37 C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 4 standards, eg, QCA
Drift : BL plus 1 standard

NITROGEN - AMMONIA + AMMONIUM
QUALITY CONTROL DATA FROM 09/01/86 TO 23/12/86

Lab: Dorset

Analytical Range: 5 to 1000 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	51	750	751	1	3.8
b :	51	250	251	1	3.5
a+b :	51	1000	1003	3	5.7
a-b :	51	500	500	0	4.6
c :	51	75.0	75.2	0.2	0.75
d :	51	25.0	24.5	-0.5	1.24
c+d :	51	100.0	99.7	-0.3	1.54
c-d :	51	50.0	50.7	0.7	1.34

s.d.(AB): Sw(within run): 3.3 S(between runs): 3.7 S/Sw: 1.12
s.d.(CD): Sw(within run): 0.95 S(between runs): 1.02 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

970 to 1030 for A+B
480 to 520 for A-B
88.0 to 112.0 for C+D
42.0 to 58.0 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	96	0.0 - 25.0	1.04	14.3
	15	25.0 - 50.0	2.20	5.8
	13	50.0 - 100.0	1.19	1.8
	19	100 - 500	4.4	2.3
	2	500 - 1000	5.0	0.6
	145	Overall	2.1	N/A

STANDARD DEVIATION (s.dup1): 1.04

W value: 1

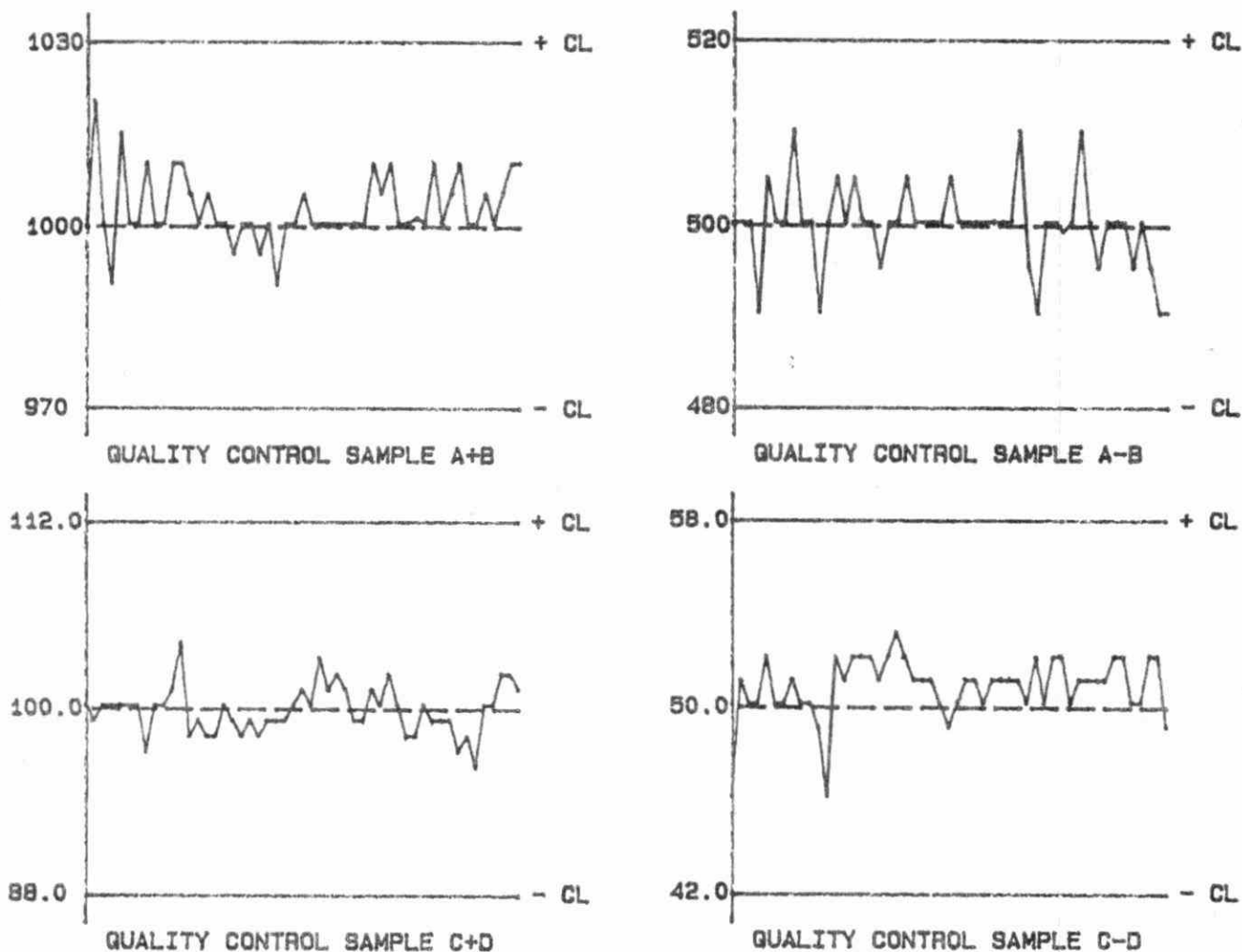
T value: 5

OTHER CHECKS:

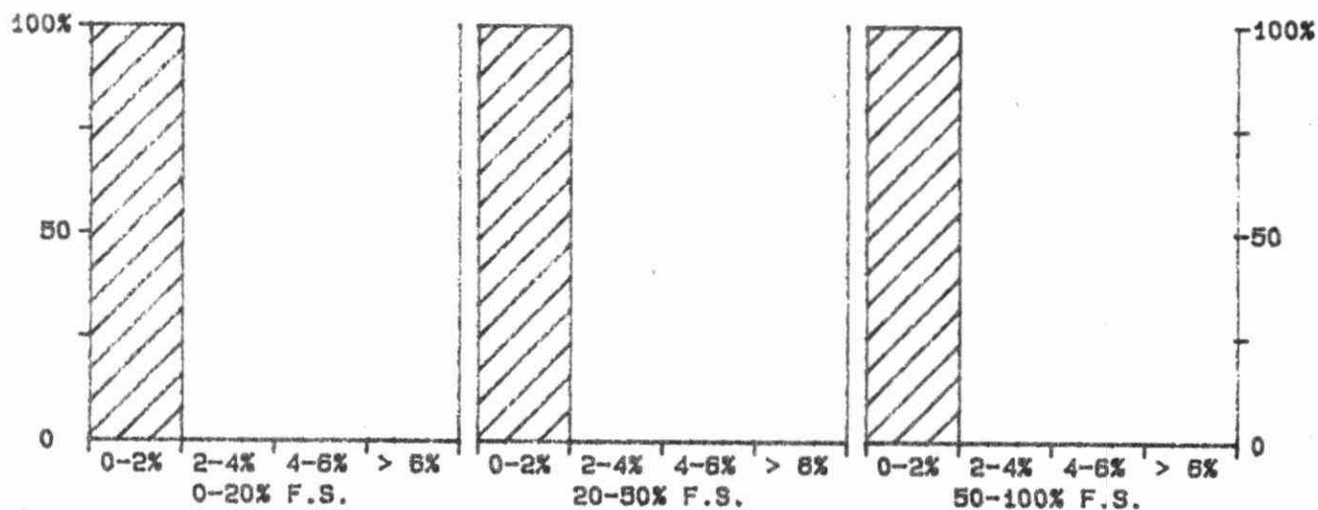
	Number of Data	Data Mean	Standard(1) Deviation
STD. CAL.	46	267	50.7
Long Term Blank	51	0.5	0.78

QUALITY CONTROL GRAPHS NITROGEN - AMMONIA + AMMONIUM (UG/L AS N)

FROM: 09/01/86
TO: 23/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 UG/L AS N

*** NITROGEN - AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced:	01/01/84
LIS Test Name Code:	NNHTFR	Units	: ug/filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004A10	Supervisor	: F. Tomassini
Sample Type/Matrix:	Teflon		

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bags

SAMPLE PREPARATION:

Filters are extracted with 25 mL of DDW in polystyrene tubes with ultrasonic treatment followed by a 20 hour rest period.

ANALYTICAL PROCEDURE:

Samples are submitted to the PRNUT workstation for analysis. Ammonia plus ammonium ions are determined on filter extracts via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Approximate absorbance : 1.1 at full scale level.

INSTRUMENTATION:

Ultrasonic bath.
Basic automated modular continuous flow system plus the following modules: 2 of 37 C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.125** T value: 0.625

CALIBRATION:

BL plus 4 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 3 standards every 10 samples

MODIFICATIONS:

01/05/84 -The procedure introduced on this date is the same as Method A for nitrogen-ammonia in HAMES except that the samples are filter extracts and the full scale concentration is 125 ug/filter as N.

NOTES:

W and T values are those of the PRNUT workstation multiplied by 25 to yield ug/filter.

*** NITROGEN - NITRATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/07/80
LIS Test Name Code: NND3FR,NNRICF Units : ug/Filter as N
Work Station Code : PRSEQ Unit Code : 361807
Method Code : 004A10 Supervisor : F. Tomassini
Sample Type/Matrix: Teflon and nylon filters from sequential filter packs and
nylon filters from LoVol filter packs.

SAMPLING

Quantity Required: 1 filter
Container : Polyethylene bags

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03N NaOH
(nylon) in polystyrene tubes with ultrasonic treatment followed by a 24 hour
rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample extract by automated
suppressed ion chromatography using an eluent mixture of 0.003M sodium
bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples
are spiked with Na₂CO₃/NaHCO₃ to match the eluent strength and maintain
background conductivity. The concentration of nitrate in mg/L as N is determined
by comparison of the sample scan to a series of standard scans. Results are
converted to ug/filter as N.
Full scale conductivity : 30 uS/cm.
Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

-Ultrasonic bath/ polystyrene tubes
-Automated modular continuous flow ion chromatographic system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.25 T value: 1.25

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples.

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified
for analysis of Teflon and nylon filter extracts by developing the above filter
extraction procedure.

10/03/84 -Microcomputer for automated sampling and timing was introduced. At
that time automated spiking of samples with Na₂CO₃/NaHCO₃ was introduced.

10/05/85 -Microcomputer used for data reduction. Three additional calibration
standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one
filter because duplicate filters are not received.

NITROGEN - NITRATE
QUALITY CONTROL DATA FROM 03/01/86 TO 29/12/86

Lab: Ion Chromatography

Analytical Range: 1.25 to 50.0 ug/Filter as II

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	163	40.0	40.1	0.1	0.35
b :	163	10.0	10.1	0.1	0.24
a+b :	163	50.0	50.2	0.2	0.42
a-b :	163	30.0	29.9	-0.1	0.43

s.d.(AB): Sw(within run): 0.30 S(between runs): 0.30 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

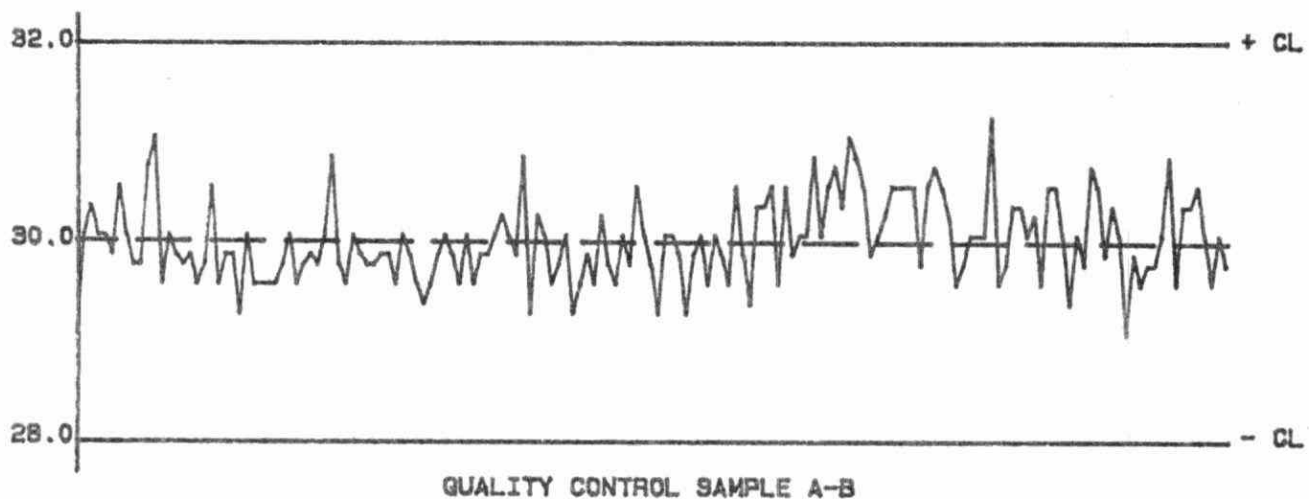
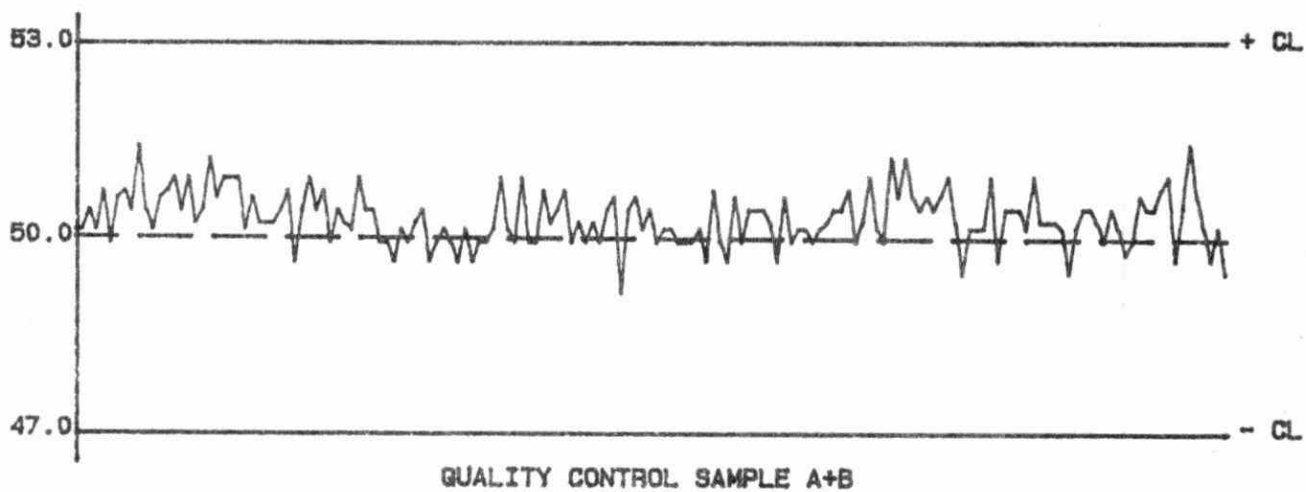
47.0 to 53.0 for A+B
28.0 to 32.0 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	210	0.00 - 5.00	0.334	21.9
	32	5.0 - 10.0	0.31	4.2
	44	10.0 - 25.0	0.60	4.0
	15	25.0 - 50.0	0.84	2.7
	301	Overall	0.43	N/A

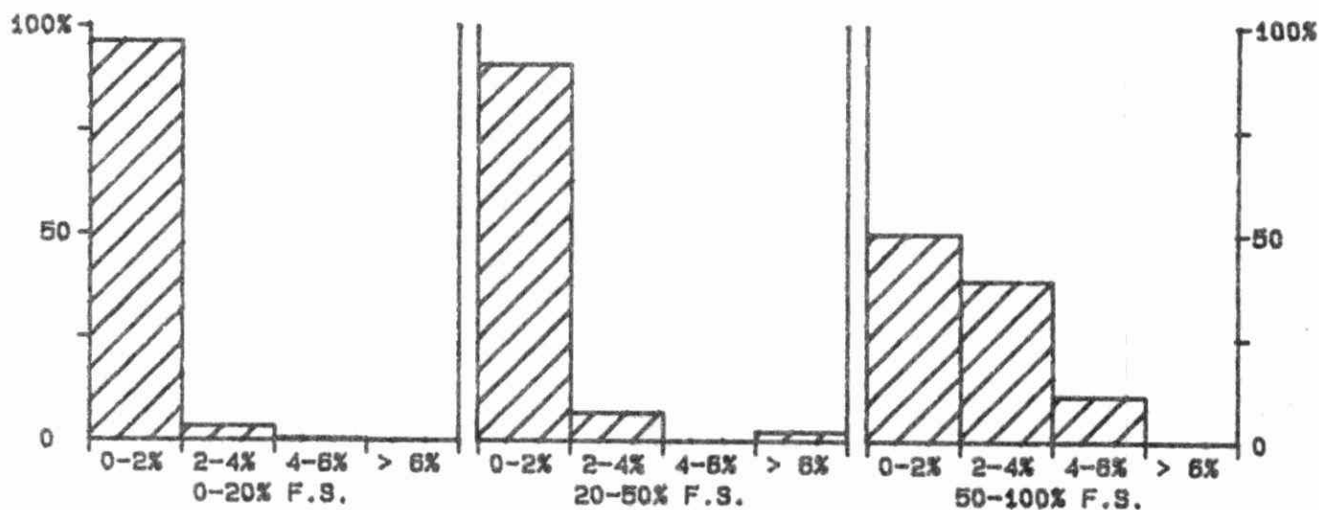
STANDARD DEVIATION (s.dupl): 0.334 W value: 0.25 T value: 1.25

QUALITY CONTROL GRAPHS NITROGEN - NITRATE (UG/FILTER AS N)

FROM: 03/01/86
TO: 29/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 UG/FILTER AS N

*** NITROGEN - NITRATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/04/78
LIS Test Name Code: NNO3UR Units : mg/L as N
Work Station Code : PRIC1 Unit Code : 064807
Method Code : 003A10 Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow.

SAMPLING:

Quantity Required: 15 mL
Container : Polyethylene

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample extract by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na2CO3/NaHCO3 to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by comparison of the sample scan to a series of standard scans.
Full scale conductivity : 10 uS/cm
N.B. Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01** T value: 0.05

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.

NITROGEN-NITRATE
QUALITY CONTROL DATA FROM 07/01/86 TO 29/12/86

Lab: Ion Chromatography

Analytical Range: 0.05 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	137	1.60	1.61	0.01	0.010
b :	137	0.40	0.41	0.01	0.007
a+b :	137	2.00	2.02	0.02	0.015
a-b :	137	1.20	1.21	0.01	0.009

s.d.(AB): Sw(within run): 0.006 S(between runs): 0.009 S/Sw: 1.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

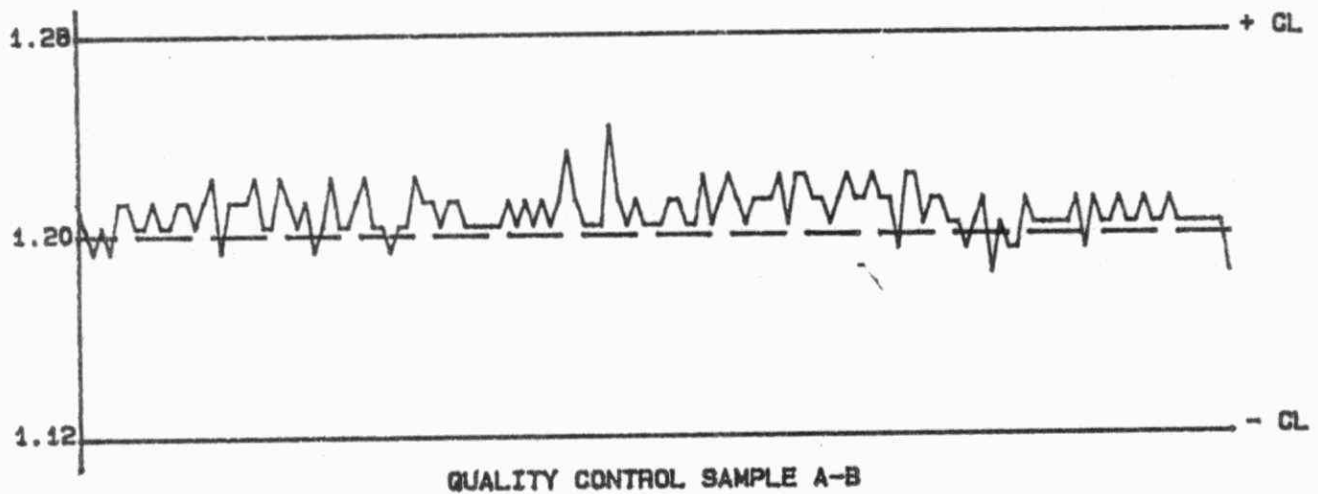
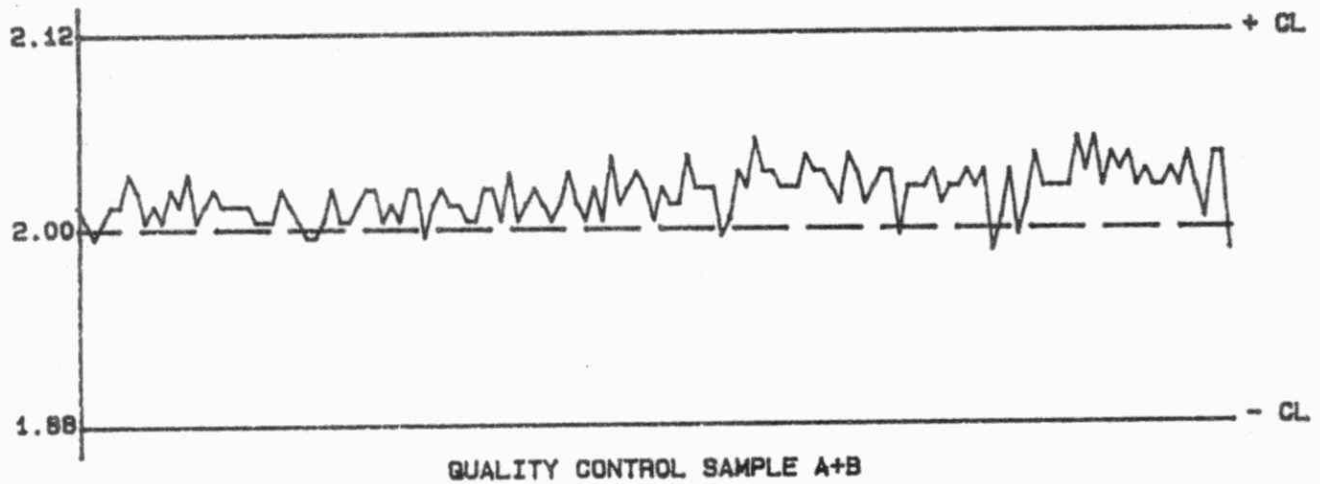
1.88 to 2.12 for A+B
 1.12 to 1.28 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	67	0.00 - 0.20	0.007	9.0
	86	0.20 - 0.50	0.011	3.2
	65	0.50 - 1.00	0.026	3.8
	32	1.00 - 2.00	0.157	11.6
	250	Overall	0.058	N/A

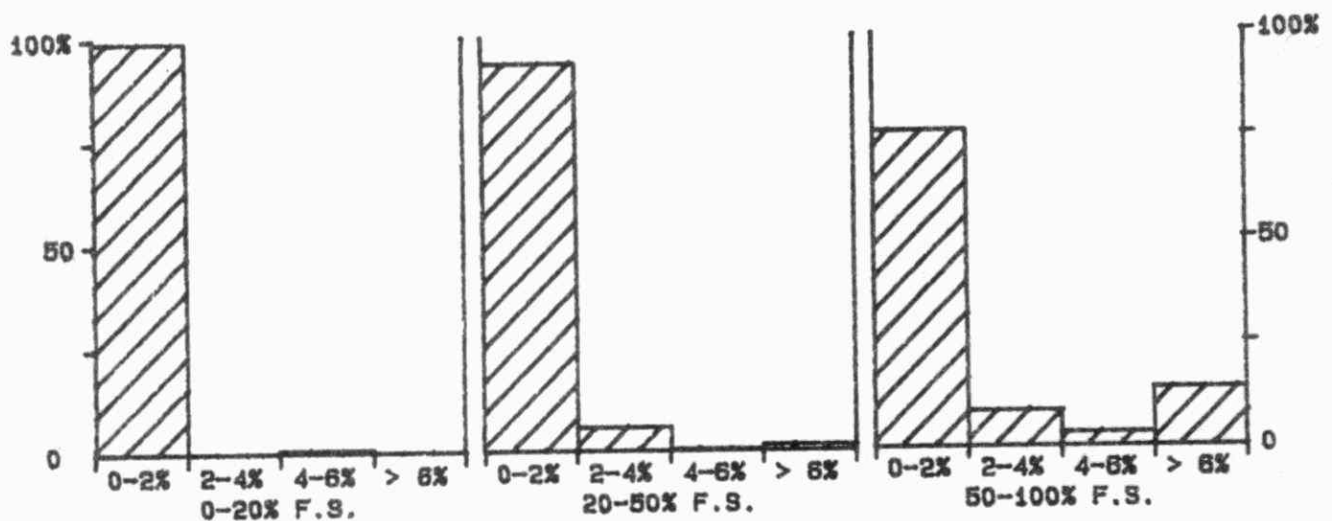
STANDARD DEVIATION (s.dupl): 0.007 W value: 0.01 T value: 0.05

QUALITY CONTROL GRAPHS NITROGEN-NITRATE (MG/L AS N)

FROM: 07/01/88
TO: 29/12/88



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

*** NITROGEN - NITRATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/07/80
LIS Test Name Code: NNO3UR Units : ug/Filter as N
Work Station Code : PRLOV Unit Code : 361807
Method Code : 004AIC Supervisor : F. Tomassini
Sample Type/Matrix: W40 filters from LoVol filter packs.

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bag

SAMPLE PREPARATION:

Filters are extracted with 50.0mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na2CO3/NaHCO3 to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as N.

Full scale conductivity : 30 uS/cm.

Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

- Ultrasonic bath; polyethylene tubes
- Automated modular continuous flow ion chromatographic system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5** T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples.

MODIFICATIONS:

01/08/81 - Ion chromatographic procedure for precipitation samples was modified for analysis of LoVol W40 filter extracts by developing the above filter extraction procedure.

10/03/84 - Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na2CO3/NaHCO3 was introduced.

10/05/85 - Microcomputer used for data reduction. Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

No data summary is available for period not covered in performance report.

NITROGEN - NITRATE
QUALITY CONTROL DATA FROM 14/01/86 TO 11/12/86

Lab: Ion Chromatography

Analytical Range: 2.5 to 100.0 ug/Filter as 11

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	80.0	80.0	0.0	0.70
b :	25	20.0	20.1	0.1	0.58
a+b :	25	100.0	100.1	0.1	0.90
a-b :	25	60.0	60.0	0.0	0.92

s.d.(AB): SW(within run): 0.65 S(between runs): 0.64 S/SW: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

94.0 to 106.0 for A+B
56.0 to 64.0 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
31	0.0 - 10.0	0.46	15.1
3	10.0 - 25.0	1.12	7.0
3	25.0 - 50.0	0.58	1.6
1	50.0 - 100.0	N/A	N/A
38	Overall	0.62	N/A

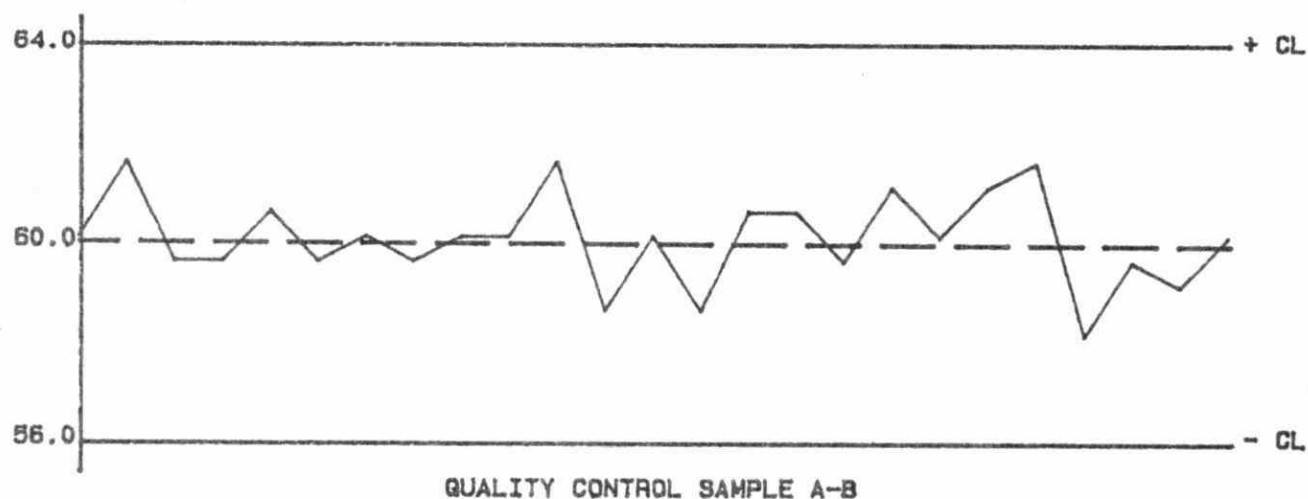
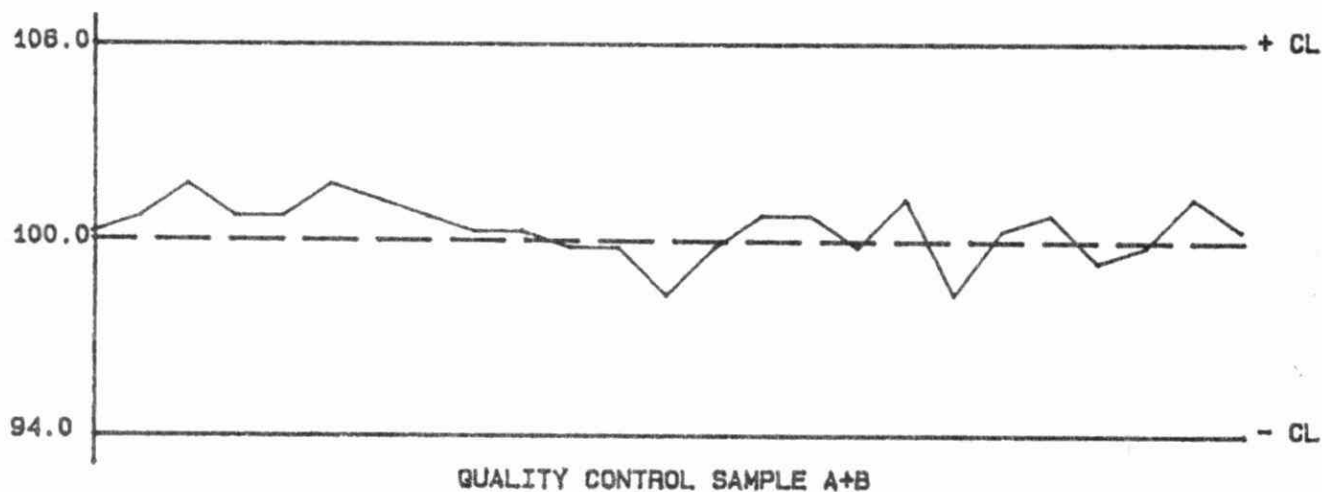
STANDARD DEVIATION (s.dupl): 0.46

W value: 0.5

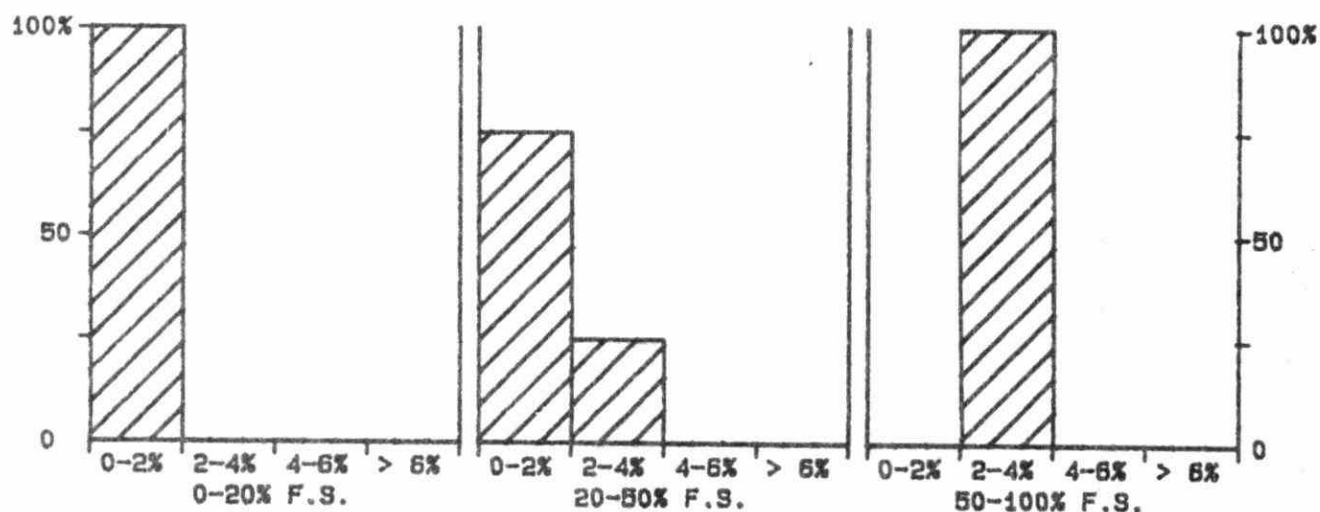
T value: 2.5

QUALITY CONTROL GRAPHS NITROGEN - NITRATE (UG/FILTER AS N)

FROM: 14/01/86
TO: 11/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/FILTER AS N

*** NITROGEN-NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/78
LIS Test Name Code:	NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents.			

SAMPLING:

Quantity Required: 50 ml.
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38 C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-naphthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.6 at the full scale level

N.B. Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37 C heating bath (7.7 ml. delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02** T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards

Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).

15/05/84 -Commadore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP8820 microcomputer introduced to replace Commadore PET.

NITROGEN-NITRATE PLUS NITRITE
QUALITY CONTROL DATA FROM 01/03/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 0.1 to 5.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	146	4.00	4.01	0.01	0.050
b :	146	1.00	1.00	0.00	0.014
a+b :	146	5.00	5.01	0.01	0.054
a-b :	146	3.00	3.00	0.00	0.050
c :	146	1.00	1.00	0.00	0.014
d :	146	0.50	0.50	-0.00	0.010
c+d :	146	1.50	1.50	0.00	0.022
c-d :	146	0.50	0.51	0.01	0.012

s.d.(AB): Sw(within run): 0.035 S(between runs): 0.037 S/Sw: 1.04
s.d.(CD): Sw(within run): 0.008 S(between runs): 0.012 S/Sw: 1.43

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.77 to 5.23 for A+B
2.85 to 3.15 for A-B
1.43 to 1.58 for C+D
0.45 to 0.55 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	209	0.00 - 0.20	0.007	10.9
	89	0.20 - 0.50	0.010	3.0
	46	0.50 - 1.00	0.013	1.8
	50	1.00 - 2.50	0.035	2.1
	40	2.50 - 5.00	0.058	1.6
	434	Overall	0.023	N/A

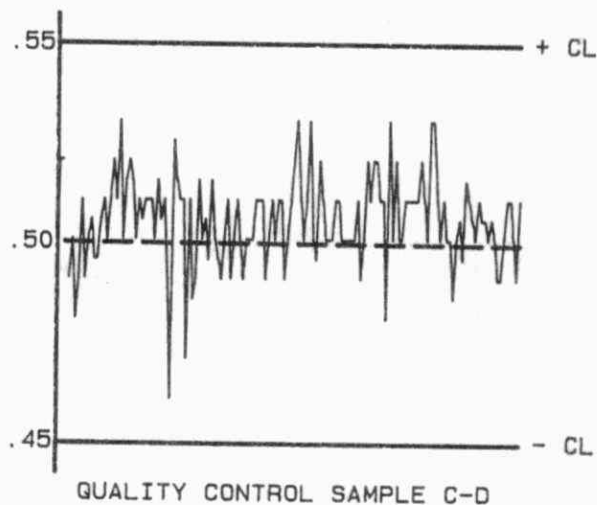
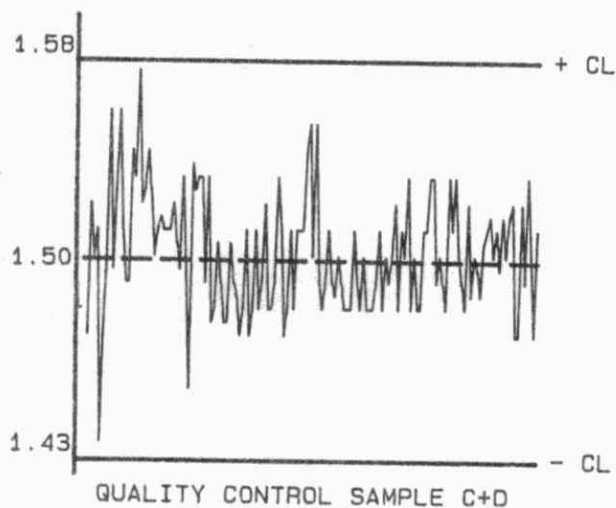
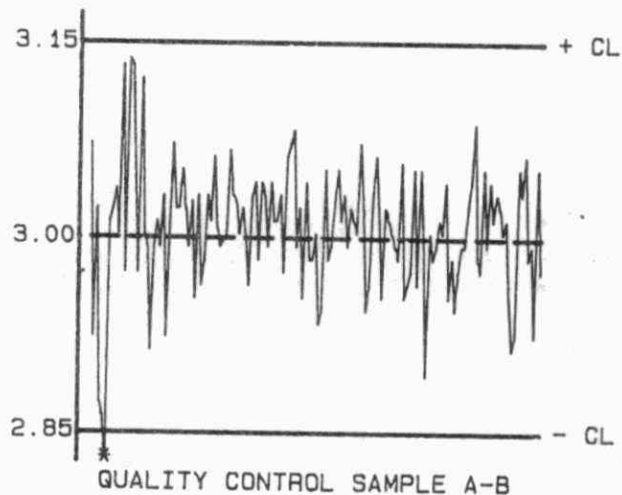
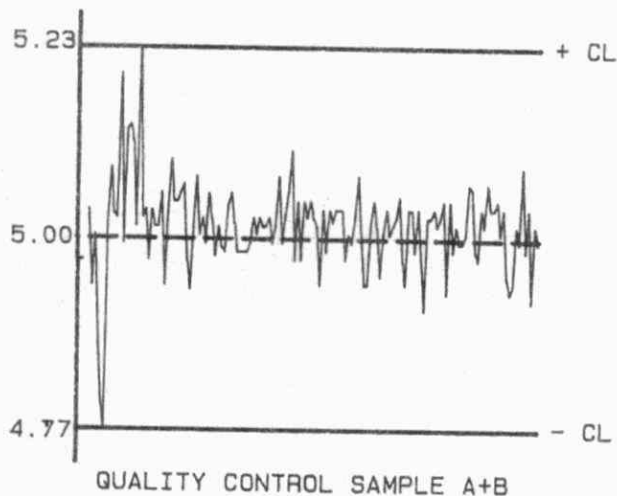
STANDARD DEVIATION (s.dupl): 0.007 W value: 0.02 T value: 0.1

OTHER CHECKS:

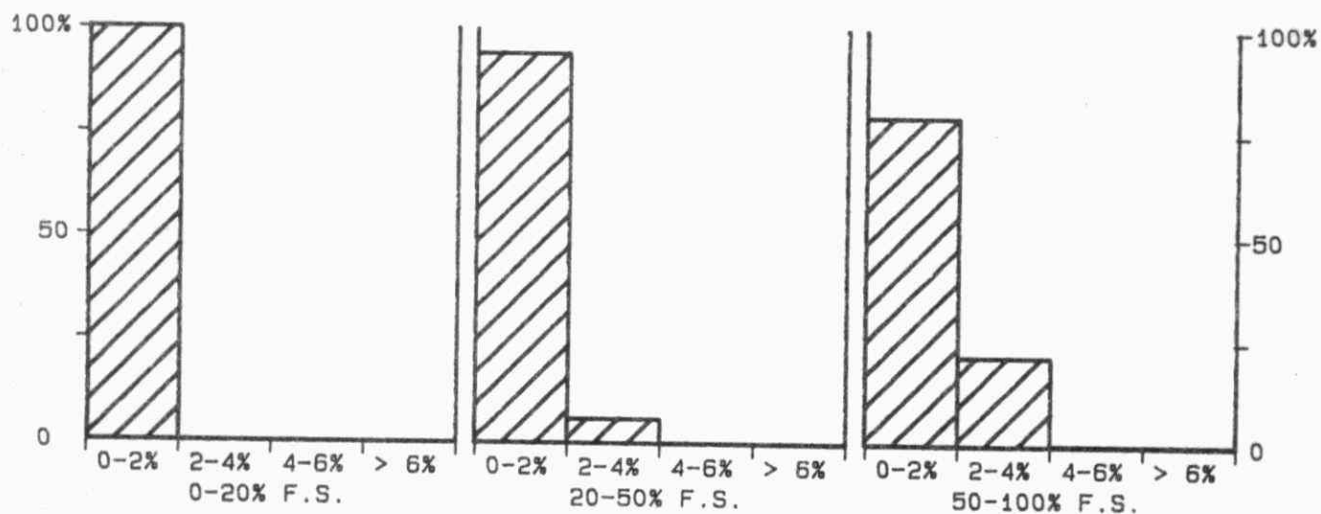
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	146	0.01	0.012

QUALITY CONTROL GRAPHS NITROGEN-NITRATE PLUS NITRITE (MG/L AS N)

FROM: 01/03/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** NITROGEN - NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/76
LIS Test Name Code:	NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix:	Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 37 C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N (1-naphthyl)ethylenediaminedihydrochloride. Approximate absorbance: 0.7 at the full scale level
N.B. Nitrogen-nitrite, nitrogen-ammonia + ammonia, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37 C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards
Drift : BL every 10 blanks; BL and standard every 20 samples
Interference: Nitrite standard (nitrate and nitrite at same concentration run separately: zero difference is expected) confirms effective operation of reduction step. Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective operation of sample dilution.

MODIFICATIONS:

01/06/85 - Ion exchange column was removed and replaced by increasing in-line sample dilution to the point that the interference check could be retained and no loss in performance was observed.

18/06/86 - HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2. One analytical range is now used.

NITROGEN - NITRATE PLUS NITRITE
QUALITY CONTROL DATA FROM 03/01/86 TO 16/12/86

Lab: Colourimetry

Analytical Range: 0.5 to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	142	35.0	34.4	-0.6	0.53
b :	142	15.4	15.1	-0.3	0.26
a+b :	142	50.4	49.6	-0.8	0.70
a-b :	142	19.6	19.3	-0.3	0.45
c :	145	15.40	15.18	-0.22	0.315
d :	145	4.20	4.07	-0.13	0.155
c+d :	145	19.60	19.25	-0.35	0.442
c-d :	145	11.20	11.11	-0.09	0.227

s.d.(AB): Sw(within run): 0.32 S(between runs): 0.42 S/Sw: 1.31
s.d.(CD): Sw(within run): 0.161 S(between runs): 0.248 S/Sw: 1.55

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.4 to 53.4 for A+B
17.6 to 21.6 for A-B
18.70 to 20.50 for C+D
10.60 to 11.80 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	227	0.00 - 2.00	0.108	25.8
	44	2.00 - 5.00	1.131	36.2
	43	5.00 - 10.00	0.516	7.1
	37	10.0 - 20.0	0.25	1.8
	8	20.0 - 50.0	0.51	1.8
	359	Overall	0.46	N/A

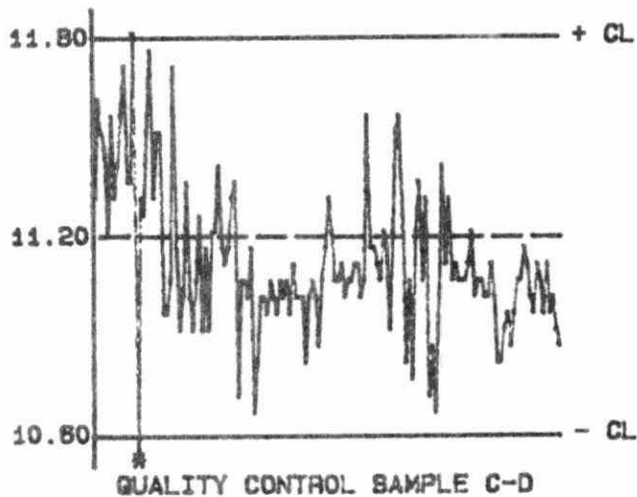
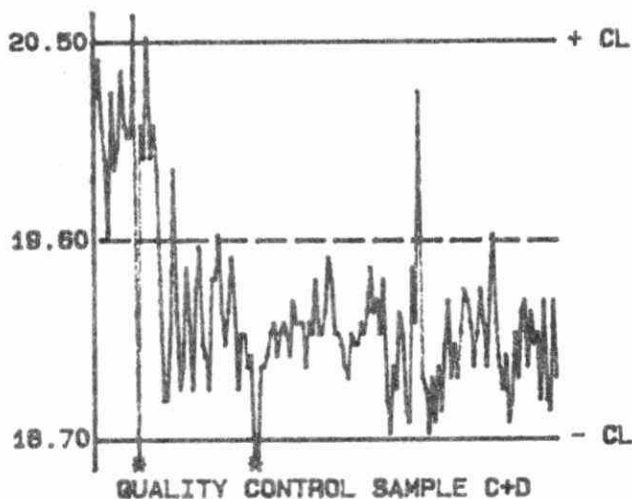
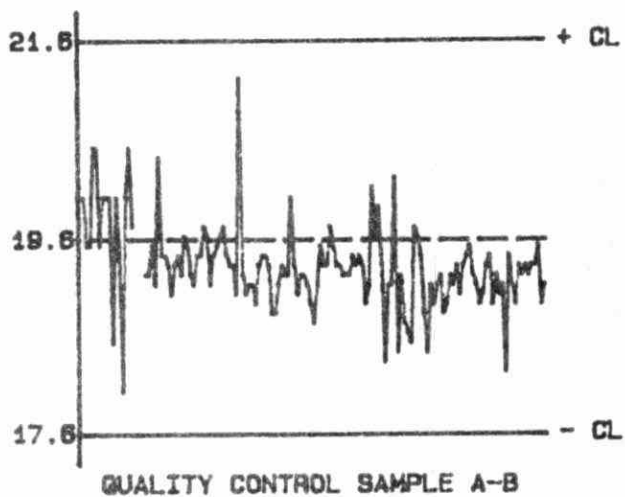
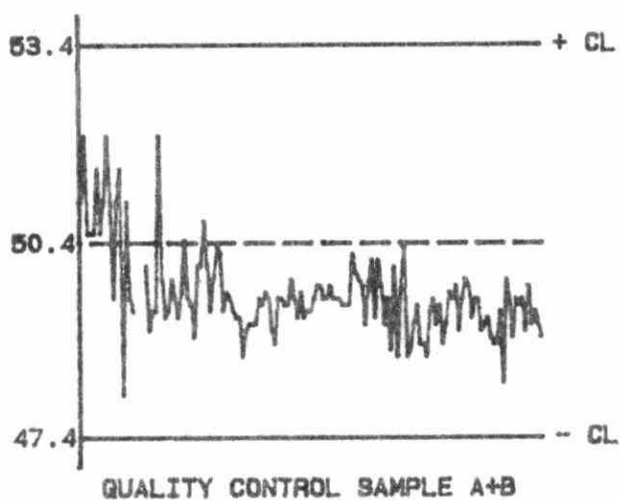
STANDARD DEVIATION (s.dup1): 0.108 W value: 0.1 T value: 0.5

OTHER CHECKS:

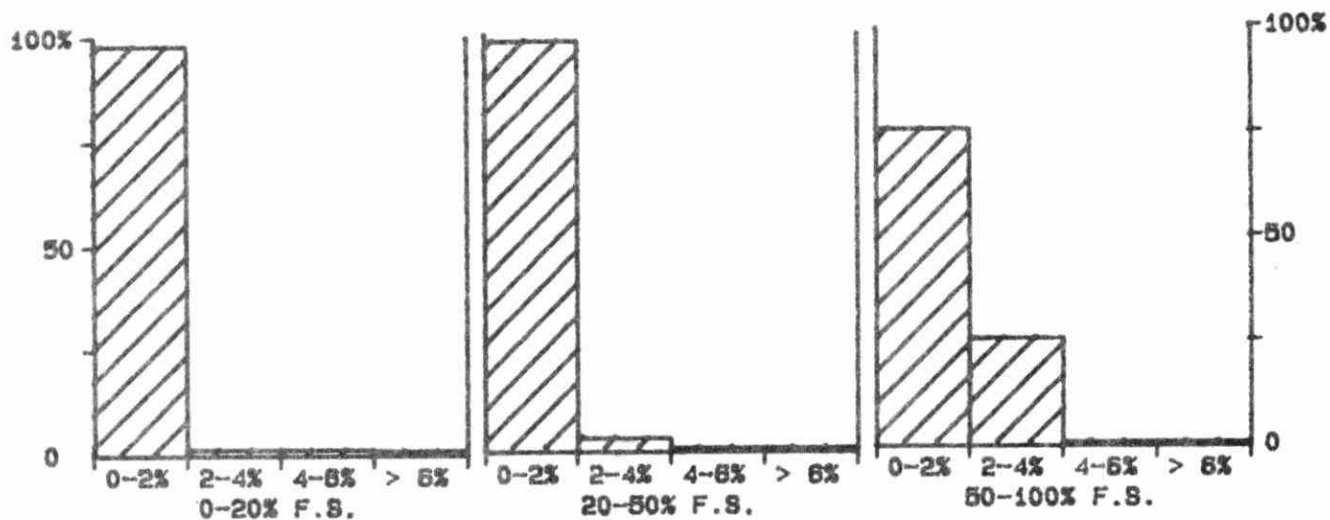
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal	18	625	44.5
NO3-NO2	18	0.11	0.081
NO3-Ca/Mg	18	-0.23	0.188
Long Term Blank	142	0.04	0.200

QUALITY CONTROL GRAPHS NITROGEN - NITRATE PLUS NITRITE (MG/L AS N)

FROM: 03/01/86
TO: 12/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** NITROGEN - NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/78
LIS Test Name Code:	NNOTUR	Units	: mg/L as N
Work Station Code	: WFND3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Sample Type/Matrix:	Ministry of Health Water Samples		

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 37 C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and NK1-naphthylethylenediaminedihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.
Approximate absorbance: 0.5 at the full scale level

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37 C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1** T value: 0.5

CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

NITROGEN-NITRATE+NITRITE
QUALITY CONTROL DATA FROM 07/01/86 TO 31/12/86

Lab: Colourimetry

Analytical Range: 0.5 to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	94	15.0	14.8	-0.2	0.19
b :	94	3.0	2.9	-0.1	0.09
a+b :	94	18.0	17.7	-0.3	0.25
a-b :	94	12.0	11.9	-0.1	0.17

s.d.(AB): SW(within run): 0.12 S(between runs): 0.15 S/SW: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

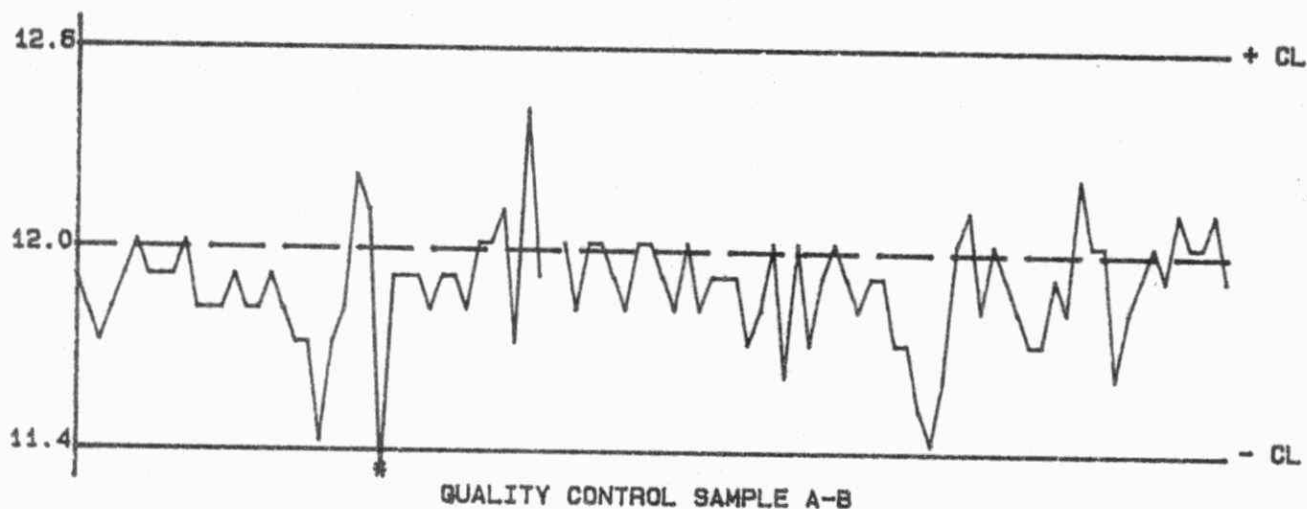
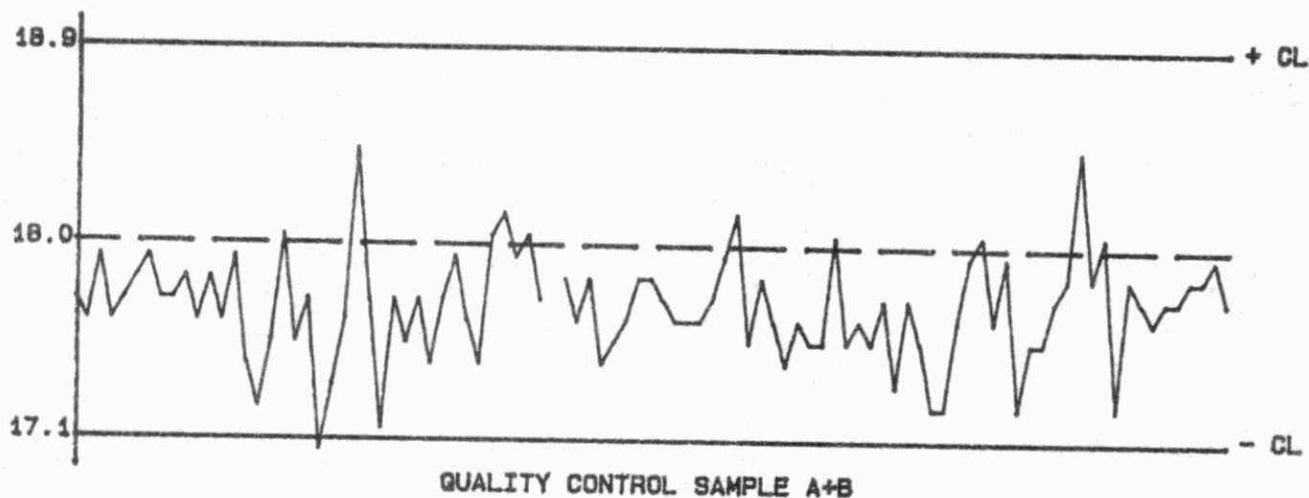
17.1 to 18.9 for A+B
11.4 to 12.6 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	180	0.0 - 2.0	0.04	10.1
	24	2.0 - 5.0	0.10	2.7
	22	5.0 - 10.0	0.13	1.8
	23	10.0 - 20.0	0.18	1.3
	249	Overall	0.08	N/A

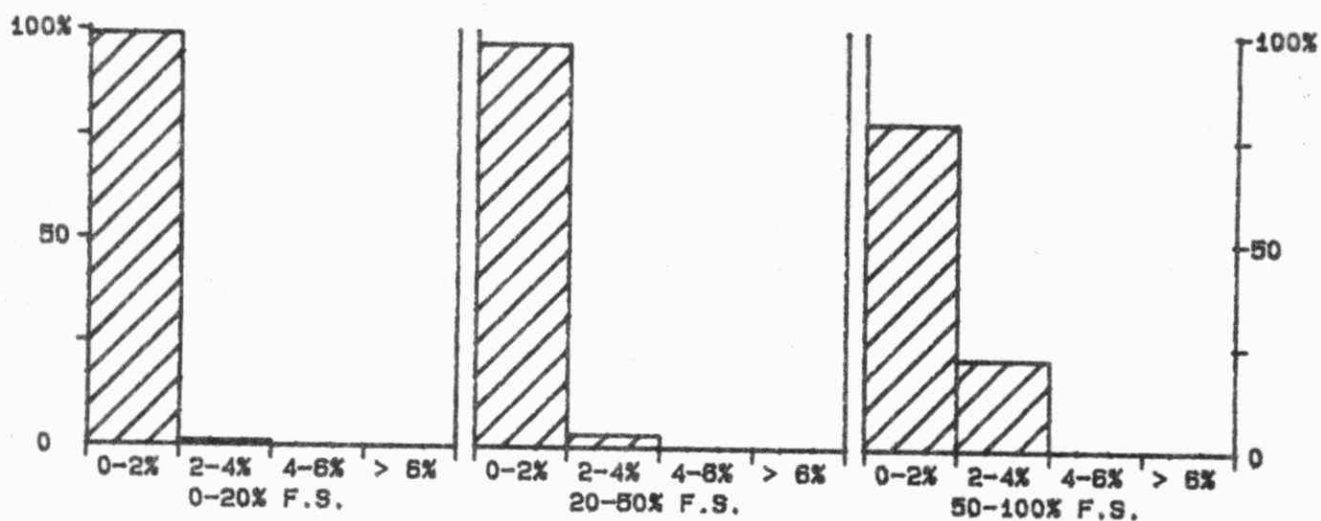
STANDARD DEVIATION (s.dupl): 0.04 W value: 0.1 T value: 0.5

QUALITY CONTROL GRAPHS NITROGEN-NITRATE+NITRITE (MG/L AS N)

FROM: 07/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS N

*** NITROGEN - NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	13/06/78
LIS Test Name Code:	NNOTFR	Units	: ug/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: F. Tomassini
Sample Type/Matrix:	Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required: 50 mL
Container : Plastic (polystyrene)

SAMPLE PREPARATION:

No sample preparation needed.

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37 C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and NK1-naphthyl)ethylenediaminedihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance : 0.4 at the full scale level.

N.B. Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37 C heating bath (7.7 ml. delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2 T value: 10

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL plus 1 standard every 10 samples

NITROGEN - NITRATE PLUS NITRITE
QUALITY CONTROL DATA FROM 09/01/86 TO 23/12/86

Lab: Dorset

Analytical Range: 10 to 500 ug/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	51	375	376	1	4.8
b :	51	125	127	2	3.9
a+b :	51	500	503	3	7.5
a-b :	51	250	248	-2	4.5

s.d.(AB): Sw(within run): 3.2 S(between runs): 4.4 S/Sw: 1.37

On any given day the calibration is accepted if the values obtained lie within the ranges:

470 to 530 for A+B
230 to 270 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	83	0 - 50	2.2	16.2
	13	50 - 100	4.1	5.6
	31	100 - 250	12.2	7.3
	10	250 - 500	4.1	1.2
	137	Overall	6.3	N/A

STANDARD DEVIATION (s.dupl): 2.2

W value: 2

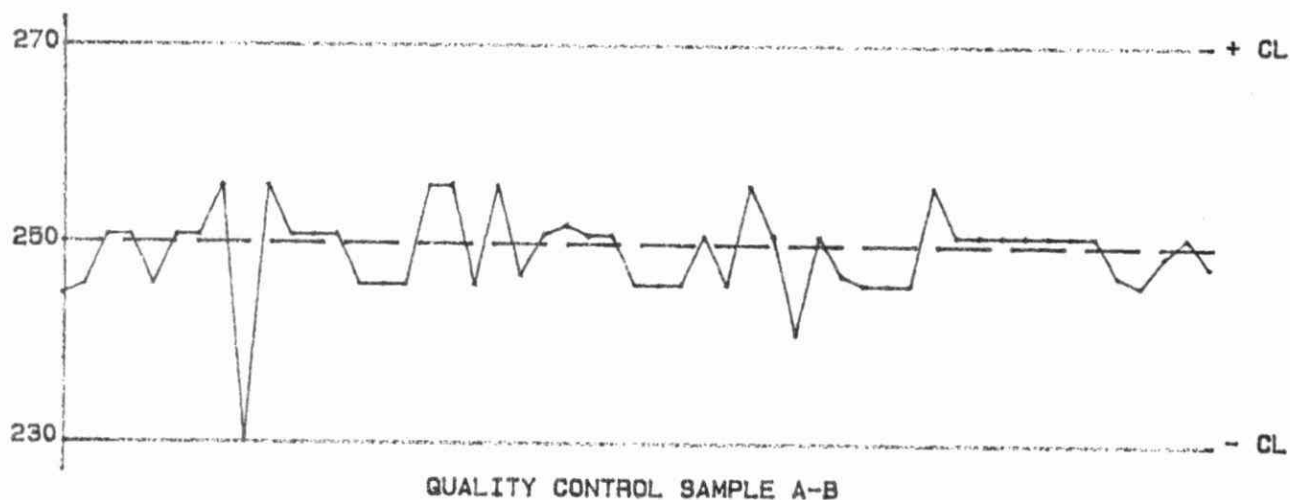
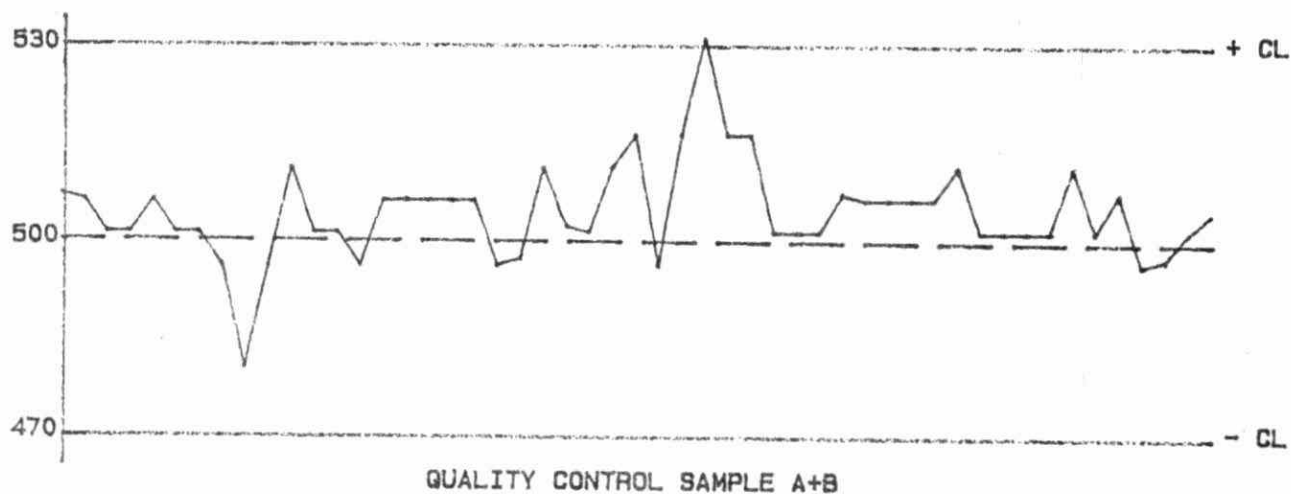
T value: 10

OTHER CHECKS:

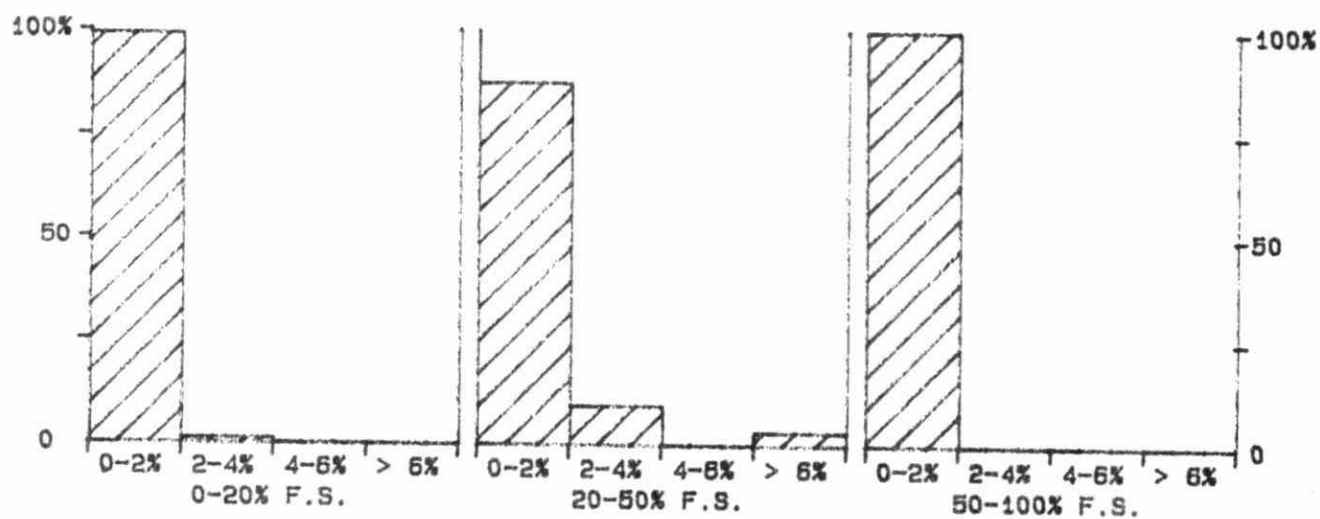
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal. :	46	359	26.3
Long Term Blank :	51	0	1.2

QUALITY CONTROL GRAPHS NITROGEN - NITRATE PLUS NITRITE (UG/L AS N)

FROM: 09/01/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 UG/L AS N

*** NITROGEN - NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/78
LIS Test Name Code:	NN02FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents.			

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide and NK 1-naphthyl)-ethylenediamine dihydrochloride. Approximate absorbance: 0.6 at the full scale level.

N.B. Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.001** T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, e.g., QCA
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G).

15/05/84 -Microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP9920 microcomputer introduced to replace Commodore PET.

NITROGEN-NITRITE
QUALITY CONTROL DATA FROM 01/03/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 0.005 to 0.250 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	146	0.200	0.197	-0.003	0.0027
b :	146	0.050	0.050	-0.000	0.0014
a+b :	146	0.250	0.246	-0.004	0.0031
a-b :	146	0.150	0.147	-0.003	0.0029
c :	146	0.050	0.050	-0.000	0.0014
d :	146	0.025	0.025	0.000	0.0013
c+d :	146	0.075	0.075	-0.000	0.0024
c-d :	146	0.025	0.025	-0.000	0.0011

s.d.(AB): Sw(within run): 0.0021 S(between runs): 0.0022 S/Sw: 1.05
s.d.(CD): Sw(within run): 0.0008 S(between runs): 0.0014 S/Sw: 1.74

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.239 to 0.261 for A+B
0.142 to 0.157 for A-B
0.067 to 0.082 for C+D
0.020 to 0.030 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	237	0.000 - 0.010	0.0009	19.2
	68	0.010 - 0.020	0.0015	10.3
	83	0.020 - 0.100	0.0032	6.4
	16	0.100 - 0.250	0.0044	2.1
	404	Overall	0.0019	N/A

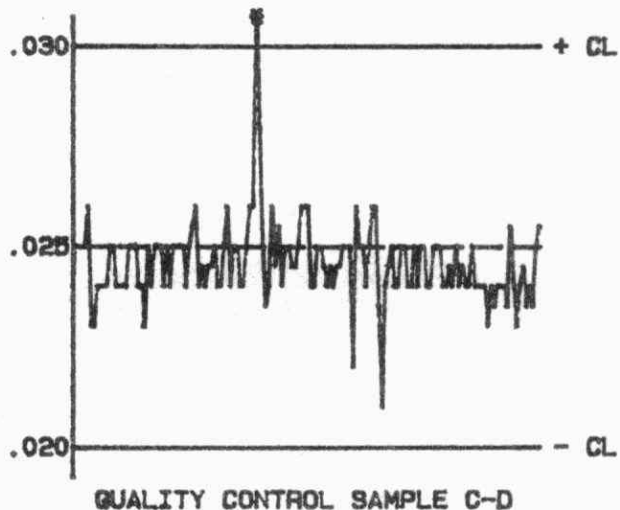
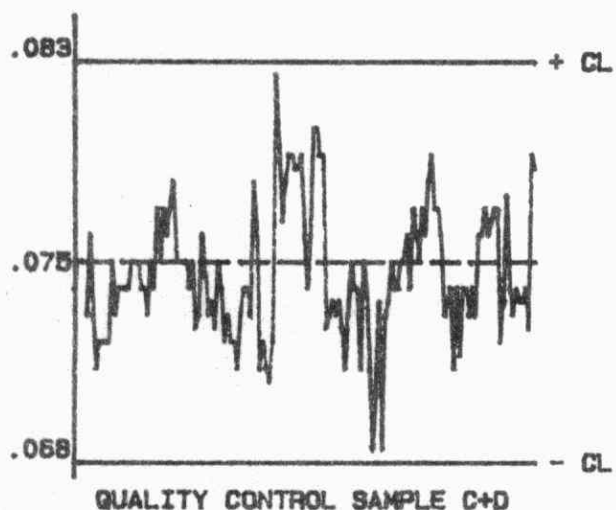
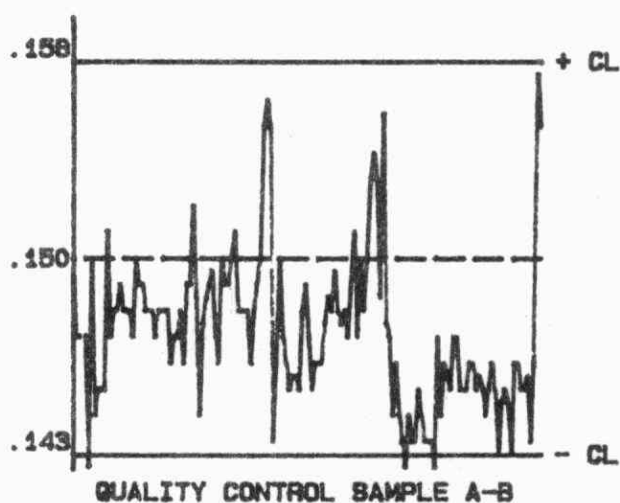
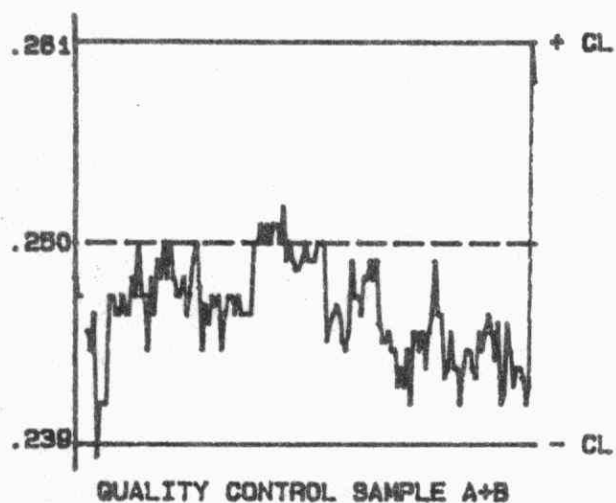
STANDARD DEVIATION (s.dupl): 0.0009 W value: 0.001 T value: 0.005

OTHER CHECKS:

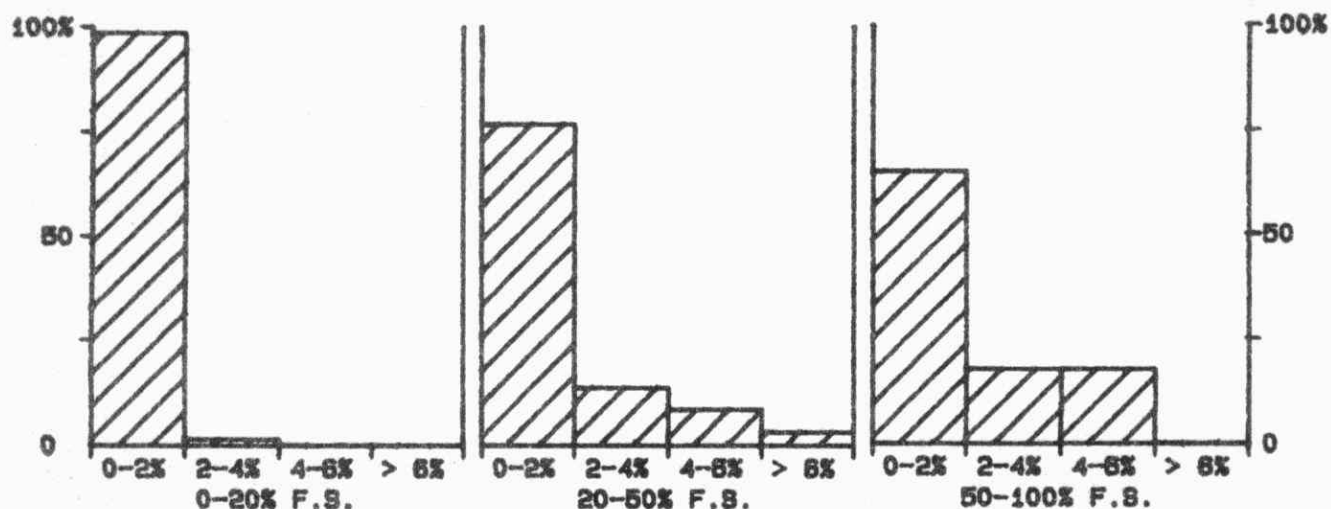
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	146	0.001	0.0015

QUALITY CONTROL GRAPHS NITROGEN-NITRITE (MG/L AS N)

FROM: 01/03/86
TO: 23/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .25 MG/L AS N

*** NITROGEN - NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/76
LIS Test Name Code:	NN02FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents			

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide and N (1-naphthyl)-ethylenediamine dihydrochloride. Approximate absorbance: 0.3 at the full scale level.
N.B. Nitrate plus nitrite, ammonia plus ammonia, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATION:

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NITROGEN - NITRITE
QUALITY CONTROL DATA FROM 03/01/86 TO 16/12/86

Lab: Colourimetry

Analytical Range: 0.025 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
c :	145	1.400	1.398	-0.002	0.0222
d :	146	0.700	0.688	-0.012	0.0204
c+d :	145	2.100	2.086	-0.014	0.0390
c-d :	145	0.700	0.709	0.009	0.0173

s.d.(CD): Sw(within run): 0.0122 S(between runs): 0.0213 S/Sw: 1.74

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.850 to 2.250 for C+D
0.600 to 0.800 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	322	0.000 - 0.200	0.0052	23.3
	45	0.20 - 1.00	0.054	11.4
	19	1.00 - 2.00	0.122	7.4
	386	Overall	0.033	N/A

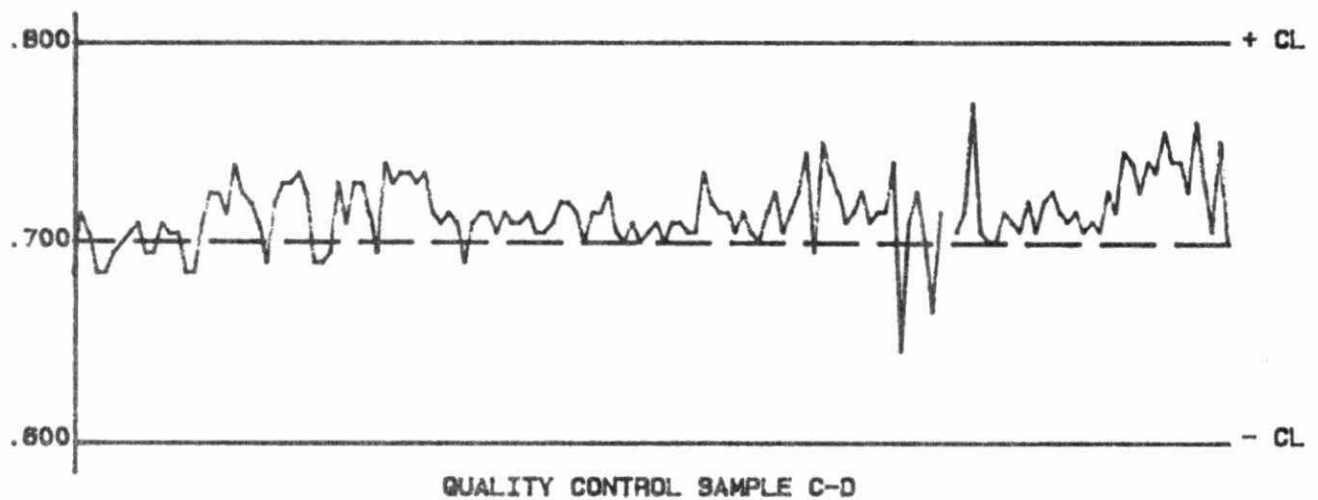
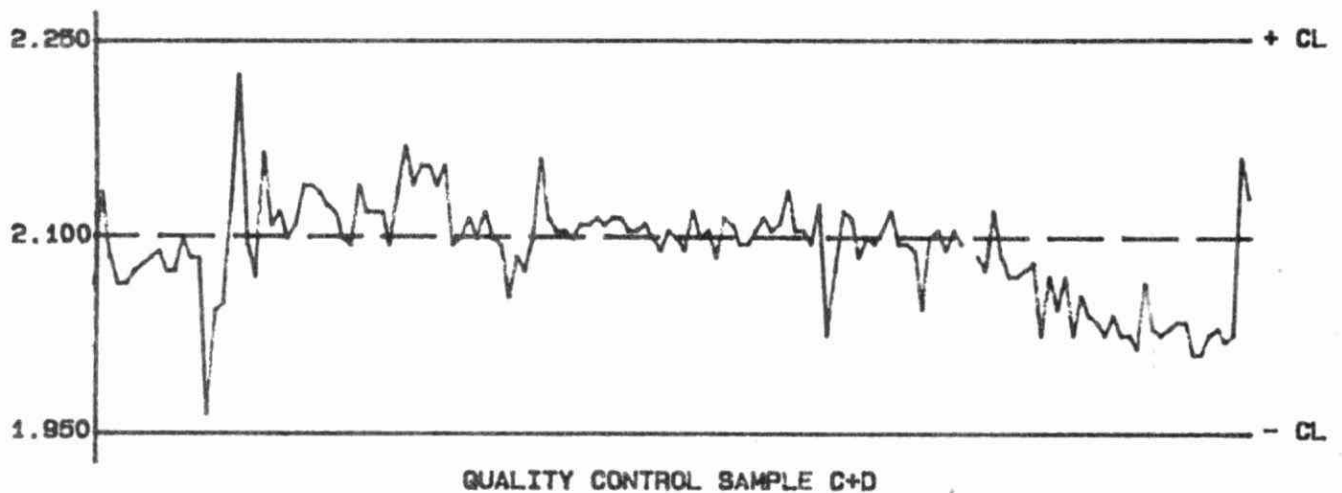
STANDARD DEVIATION (s.dupl): 0.0052 W value: 0.005 T value: 0.025

OTHER CHECKS:

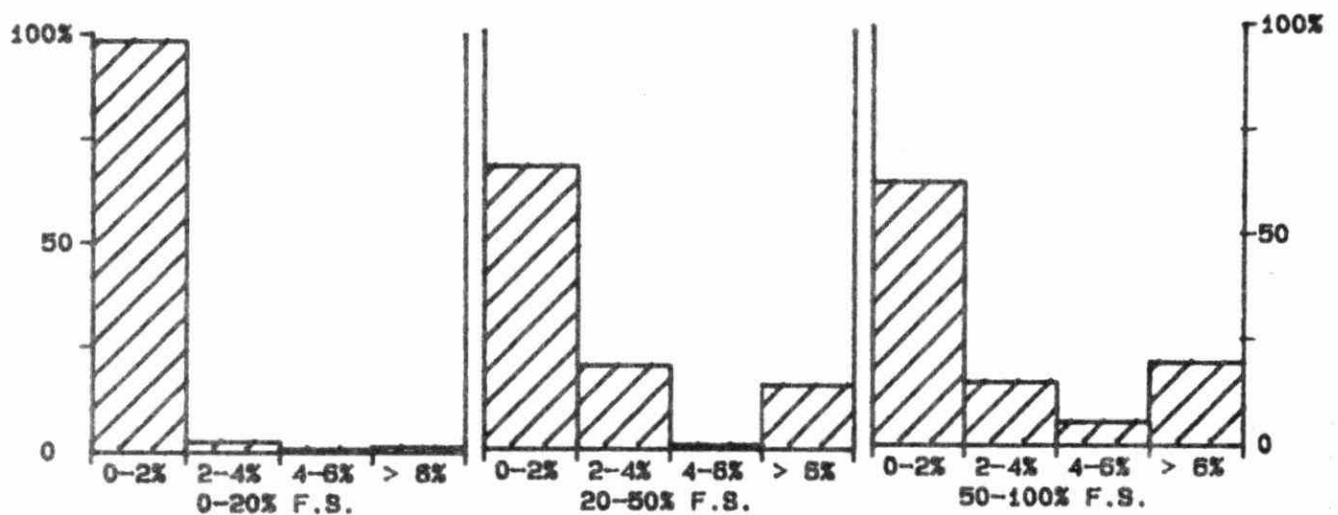
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	18	527	55.5
Long Term Blank :	143	0.002	0.0043

QUALITY CONTROL GRAPHS NITROGEN - NITRITE (MG/L AS N)

FROM: 03/01/86
TO: 10/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 2 MG/L AS N

*** NITROGEN-TOTAL KJELDAHL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/79
LIS Test Name Code:	NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents.			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200 C and 360 C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.
Approximate absorbance: 0.3 at the full scale level
N.B. Total phosphorus is determined simultaneously.

INSTRUMENTATION:

- Block digesters(2)
- Basic automated modular continuous flow system plus 1 module:37 C bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm.
- Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02** T value: 0.1

CALIBRATION:

BL plus 4 undigested standards

CONTROLS:

Calibration : LTBL plus 2 undigested standards, eg, QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, eg, R1
Drift : BL every 10 samples; BL plus undigested standard every 20 samples

MODIFICATIONS:

15/08/83 -Microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic.
26/02/86 -HP9920 microcomputer replaced Commodore PET.

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

NITROGEN-TOTAL KJELDAHL
QUALITY CONTROL DATA FROM 26/02/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 0.1 to 2.00 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	163	1.50	1.50	-0.00	0.016
b :	163	0.50	0.50	-0.00	0.025
a+b :	163	2.00	2.00	-0.00	0.034
a-b :	163	1.00	1.00	0.00	0.026

s.d.(AB): Sw(within run): 0.018 S(between runs): 0.021 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.81 to 2.09 for A+B
0.94 to 1.06 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	163	1.40	1.36	0.045
r2 :	163	0.84	0.82	0.058
r3 :	162	0.28	0.27	0.021

DUPLICATES:

	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	75	0.00 - 0.20	0.015	9.9
	275	0.20 - 0.50	0.025	7.7
	86	0.50 - 1.00	0.037	5.5
	22	1.00 - 2.00	0.070	4.7
	458	Overall	0.030	N/A

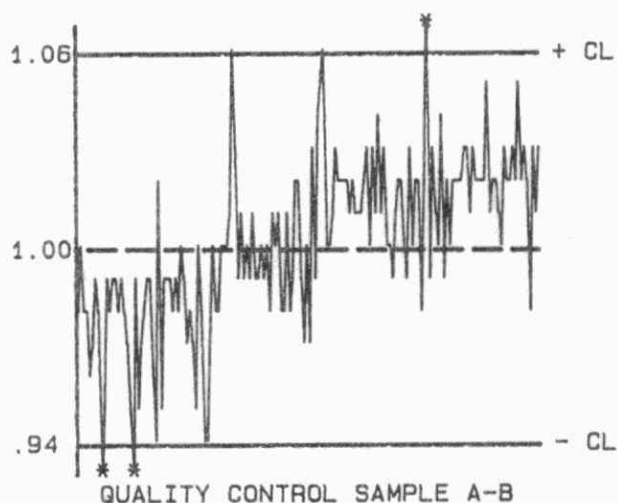
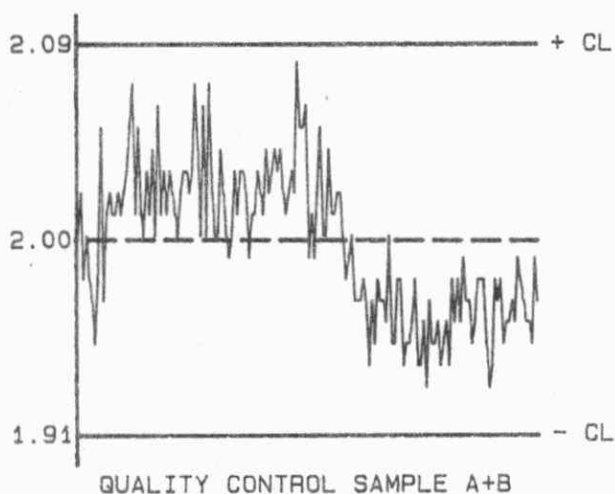
STANDARD DEVIATION (s.dup1): 0.015 W value: 0.02 T value: 0.1

OTHER CHECKS:

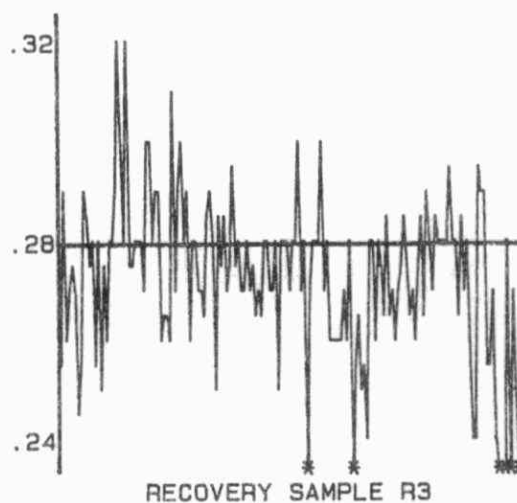
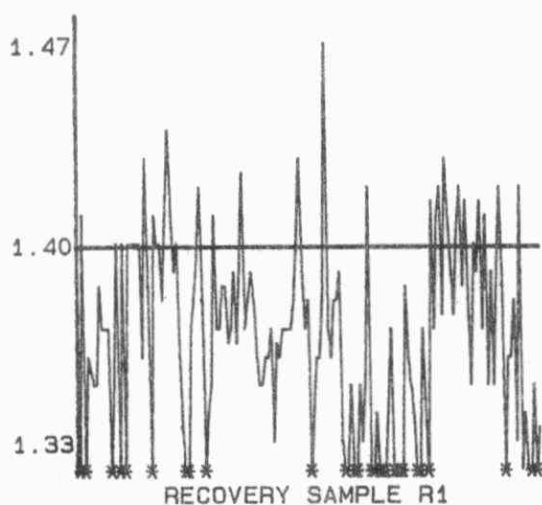
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	163	-0.01	0.010
Digested Blank :	161	0.02	0.023

QUALITY CONTROL GRAPHS NITROGEN-TOTAL KJELDAHL (MG/L AS N)

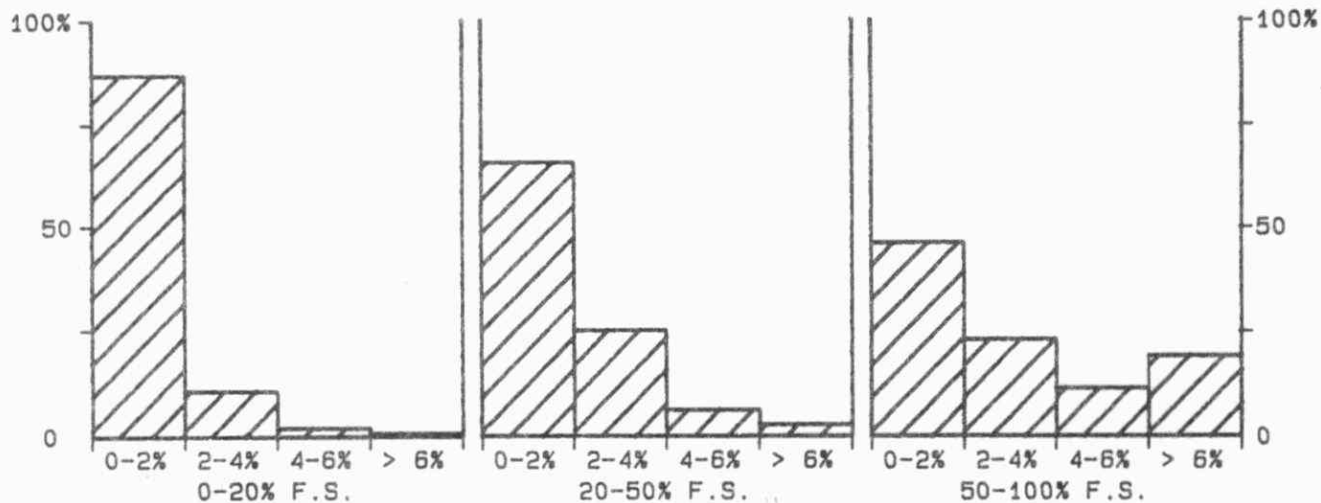
FROM: 26/02/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** NITROGEN - TOTAL KJELDAHL ***

IDENTIFICATION:

Laboratory : Colourimetry Method Introduced: 01/04/79
LIS Test Name Code: NNTKUR Units : mg/L as N
Work Station Code : STKNP Unit Code : 064807
Method Code : 004BC2 Supervisor : M. Rawlings
Sample Type/Matrix: Sewage, Industrial Waste, Domestic Waters, Effluents,
Leachates

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200 C and 360 C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 1.1 at the full scale level

N.B. Total phosphorus is determined simultaneously.

INSTRUMENTATION:

-Block digesters(2)
-Basic automated modular continuous flow system plus one heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 6 undigested standard

CONTROLS:

Calibration : LTBL plus 4 undigested standards, eg, QCA
Recovery : 2 digested BL plus 3 digested standards in duplicate, eg, R1
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/10/85 -Higher range selected, full scale changed from 10 to 25 mg/L as N.
New calibration controls added.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NOTES:

**System is calibrated with undigested standards. Minimum dilution is 50% (i.e. factor of two). Therefore actual W and T values are twice that listed.

NITROGEN - TOTAL KJELDAHL
QUALITY CONTROL DATA FROM 03/01/86 TO 16/12/86

Lab: Colourimetry

Analytical Range: 0.25 to 25.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	176	17.5	17.4	-0.1	0.18
b :	175	7.0	6.9	-0.1	0.12
a+b :	175	24.5	24.3	-0.2	0.26
a-b :	175	10.5	10.5	0.0	0.17
c :	175	7.00	6.89	-0.11	0.121
d :	172	1.40	1.40	-0.00	0.215
c+d :	171	8.40	8.28	-0.12	0.258
c-d :	171	5.60	5.49	-0.11	0.236

s.d.(AB): Sw(within run): 0.12 S(between runs): 0.15 S/Sw: 1.27
s.d.(CD): Sw(within run): 0.167 S(between runs): 0.174 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.4 to 25.6 for A+B
9.8 to 11.2 for A-B
7.85 to 8.85 for C+D
5.30 to 5.90 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	166	17.5	17.4	1.05
r2 :	166	7.00	6.82	0.291
r3 :	170	3.50	3.35	0.126

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
206	0.00 - 1.00	0.091	19.8
70	1.00 - 2.00	0.152	10.6
59	2.00 - 5.00	0.218	6.5
64	5.0 - 10.0	0.28	3.8
67	10.0 - 25.0	0.36	2.3
466	Overall	0.21	N/A

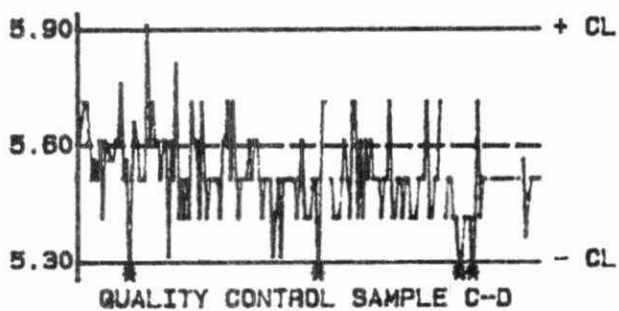
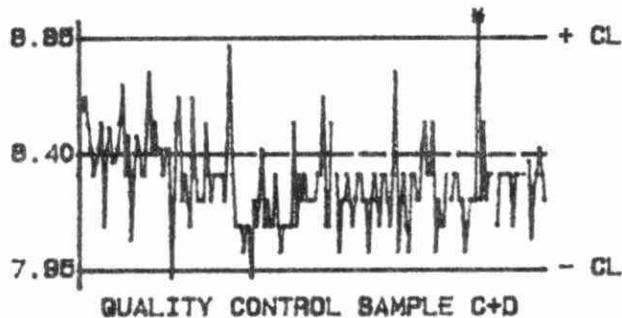
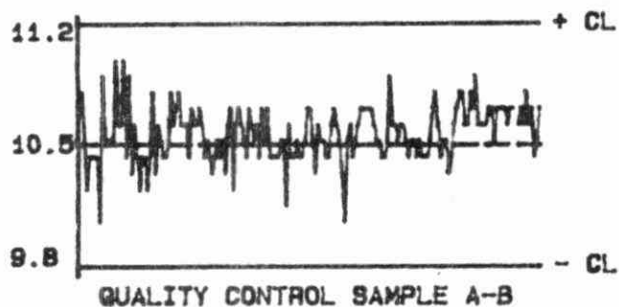
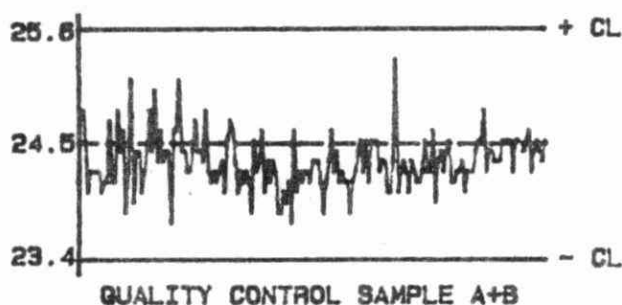
STANDARD DEVIATION (s.dup1): 0.091 W value: 0.05 T value: 0.25

OTHER CHECKS:

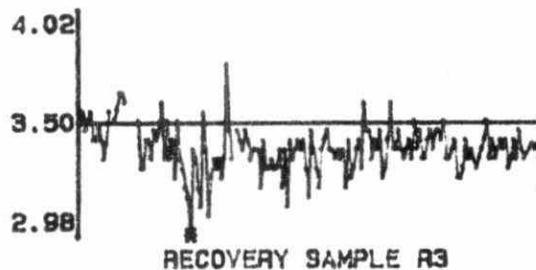
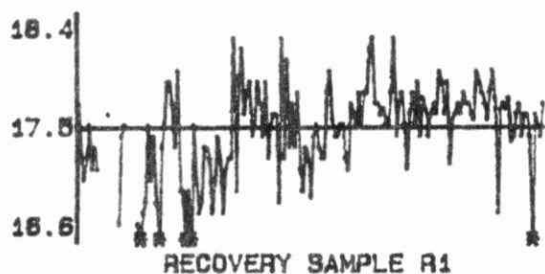
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	21	256	23.0
Long Term Blank :	174	0.07	0.058
Digested Blank :	165	0.07	0.051

QUALITY CONTROL GRAPHS NITROGEN - TOTAL KJELDAHL (MG/L AS N)

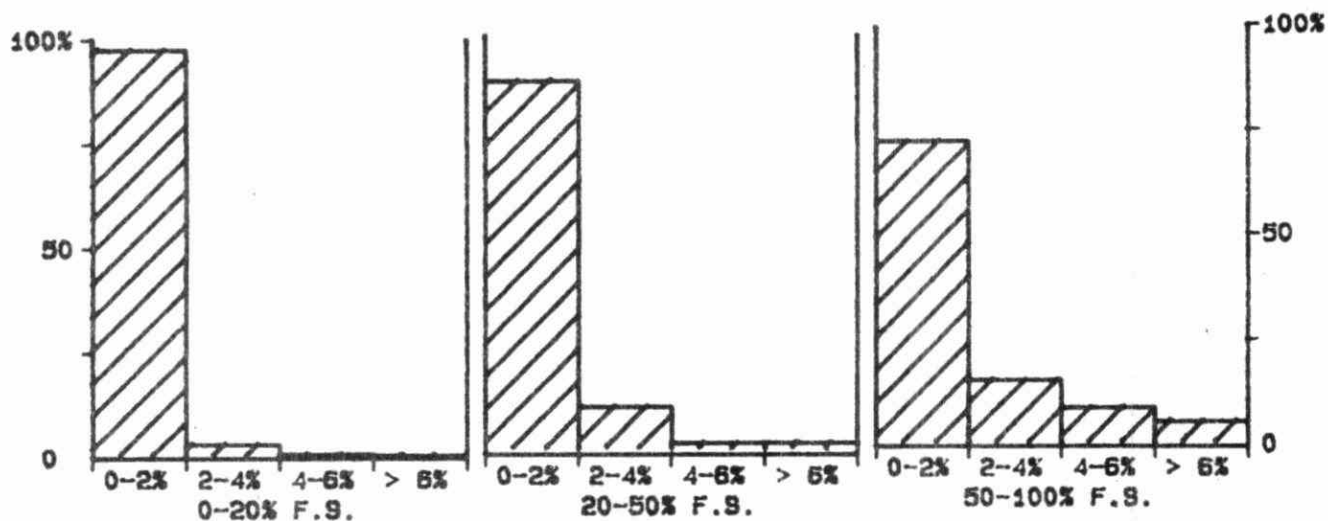
FROM: 03/01/86
TO: 18/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 25 MG/L AS N

*** OXYGEN - BIOCHEMICAL DEMAND ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced:	Before '61
LIS Test Name Code:	BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001A12	Supervisor	: P. Campbell
Sample Type/Matrix:	Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required: 400 mL
Container : Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Using dissolved oxygen (DO) analyses, samples are measured for oxygen depletion after a five day period (BOD5) of storage in the dark at 20 C. If necessary dilutions are made with aerated, nutrient-enriched water to obtain a 50-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples calculation of an appropriate seed correction is required.

INSTRUMENTATION:

- Weston and Stack Oxygen analyzer plus DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen.
- Titration equipment for Winkler analysis of dissolved oxygen
- Incubator(19-21 C); BOD bottles (300mL)

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION(DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

CONTROLS:

Calibration(DO): 2 "solutions" of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the DO probe and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO probe.

Recovery(BOD5): 2 BL plus 3 standards, eg, R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.

Drift(DO) : Air saturated distilled water after every 24 samples.

MODIFICATIONS

01/05/81 -Quality control program for DO was expanded, and the use of standard 300 mL BOD bottles was restored.

25/06/84 -Digital burette (readability to 0.01mL) replaced glass burette.

03/03/86 -Microcomputer system interfaced to oxygen meter for workstation control and direct computer input.

OXYGEN DEMAND - BIOCHEMICAL
QUALITY CONTROL DATA FROM 02/01/86 TO 19/12/86

Lab: Solids and BOD

Analytical Range: 1 to 400 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	94	0.00	0.00	0.00	0.113
b :	94	0.00	-0.01	-0.01	0.125

On any given day the calibration is accepted if the values obtained for A and B lie within the range:

-0.25 to 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	97	2.17	2.16	0.105
r2 :	97	4.34	4.28	0.348
r3 :	96	6.52	6.45	0.260

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
22	0.0 - 5.0	0.30	12.9
30	5 - 20	1.3	10.9
42	20 - 50	2.4	6.8
58	50 - 100	4.1	5.2
70	100 - 400	7.5	5.0
222	Overall	4.9	N/A

STANDARD DEVIATION (s.dup1): 0.30

W value: 0.2

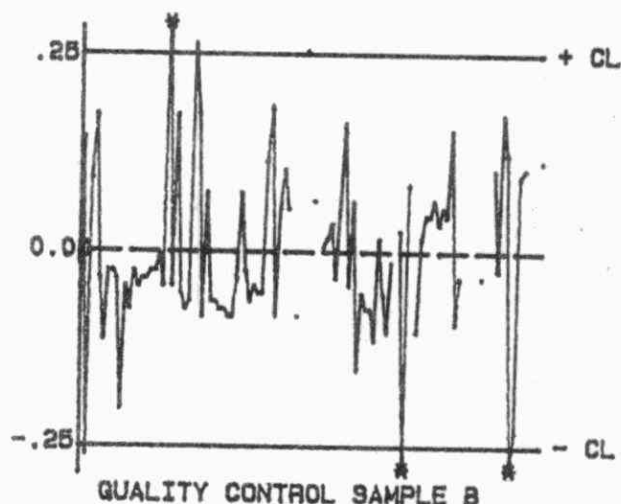
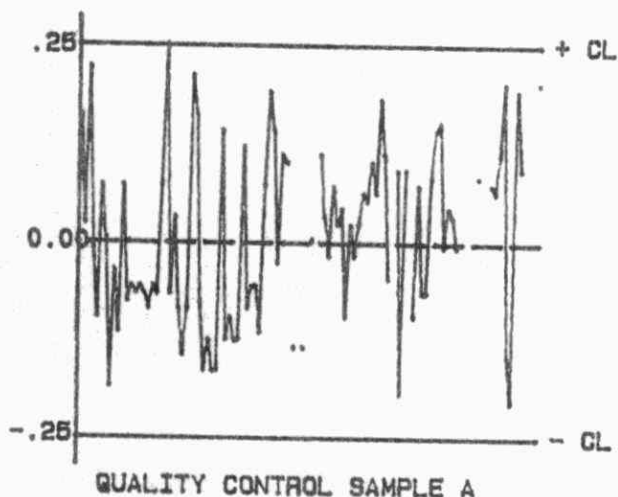
T value: 1

OTHER CHECKS:

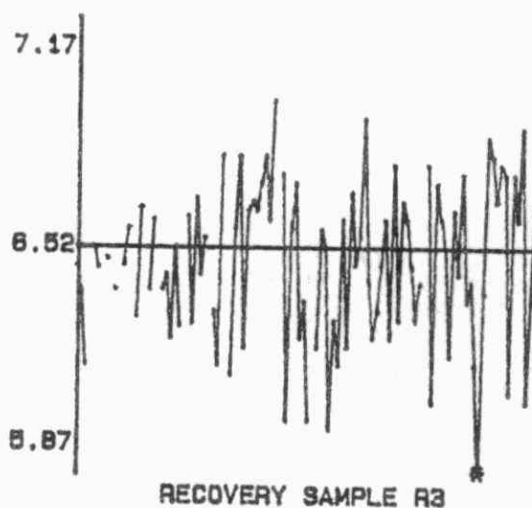
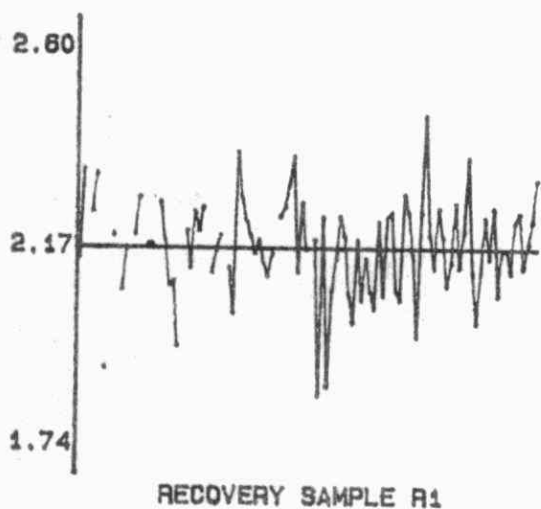
	Number of Data	Data Mean	Standard(1) Deviation
5 day DDW Blank :	98	0.15	0.102
5 day BOD Blank :	97	0.22	0.142

QUALITY CONTROL GRAPHS OXYGEN DEMAND - BIOCHEMICAL (MG/L AS O)

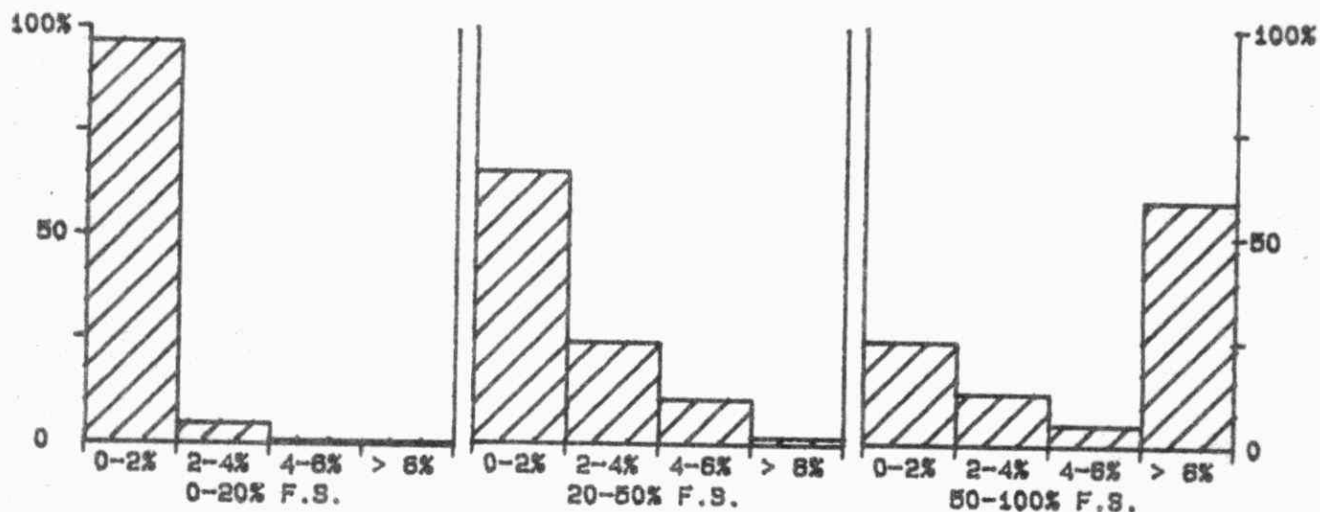
FROM: 02/01/86
TO: 19/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** OXYGEN - CHEMICAL DEMAND ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/07/82
LIS Test Name Code:	COD, CODF	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2, 101BT0	Supervisor	: M. Rawlings
Sample Type/Matrix:	Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required: 25 mL
Container : Glass

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150 C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.05 at the full scale level

INSTRUMENTATION:

Culture tubes with Teflon closures; mechanical-convection oven
-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1** T value: 5

CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration : 2 digested standards, eg, QCA
Recovery : 2 digested standards, eg, R1
Drift : Undigested BL every 10 samples; standard plus BL at end of run
Interference: Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

MODIFICATIONS:

30/06/82 -Manual COD procedure described in HAMES was discontinued.
Development report on the current procedure, described above, is available on request.

NOTES:

-In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week.

-Chemical oxygen demand analyses for Rivers and Lakes' samples are set up in the latter laboratory, but completed in the Sewage/Industrial laboratory. Thus the 1985 performance data report only refers to duplicate results. Please consult the Sewage/Industrial report for the remaining QC data.

OXYGEN DEMAND - CHEMICAL
QUALITY CONTROL DATA FROM 06/01/86 TO 24/12/86

Lab: Colourimetry

Analytical Range: 5 to 100.0 mg/l as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	40.0	39.4	-0.6	0.86
b :	25	10.0	9.7	-0.3	1.21
a+b :	25	50.0	49.1	-0.9	1.71
a-b :	25	30.0	29.8	-0.2	1.22

s.d.(AB): SW(within run): 0.86 S(between runs): 1.05 S, SW: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.0 to 53.0 for A+B
28.0 to 32.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn, Measured	Standard(1) Deviation
r1 :	22	40.0	36.4	2.78
r2 :	22	10.0	9.0	1.65

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
25	0.0 - 10.0	0.78	18.9
23	10.0 - 20.0	1.03	7.6
10	20.0 - 50.0	2.50	9.0
2	50.0 - 100.0	1.19	1.6
60	Overall	1.32	N/A

STANDARD DEVIATION (s.dup1): 0.78

W value: 1

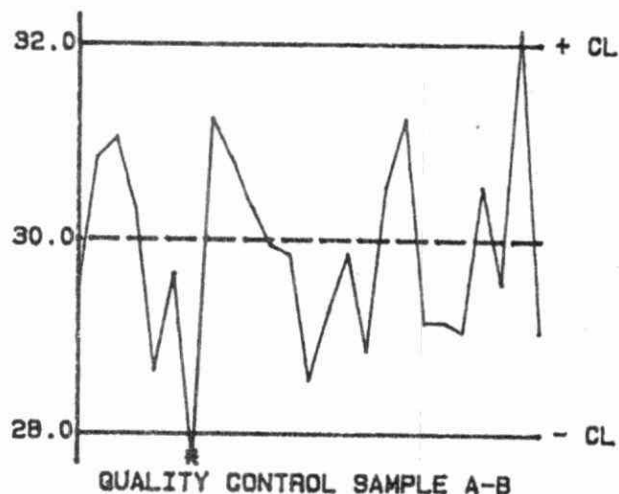
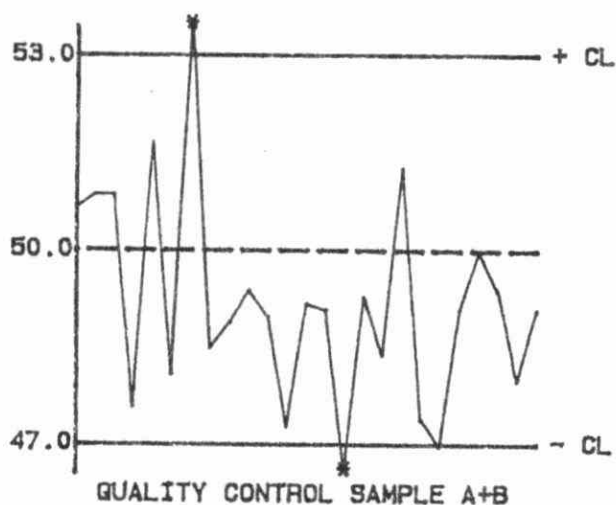
T value: 5

OTHER CHECKS:

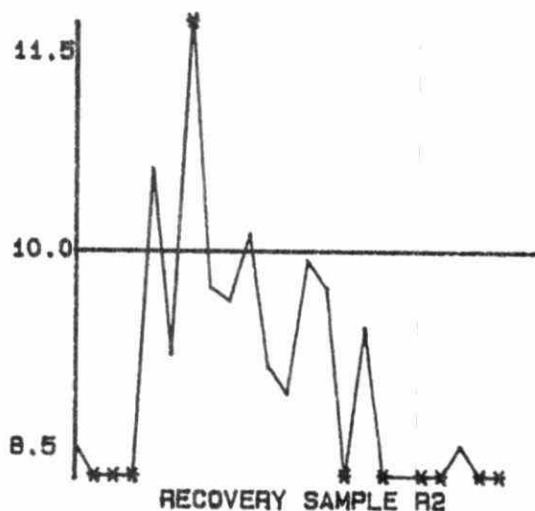
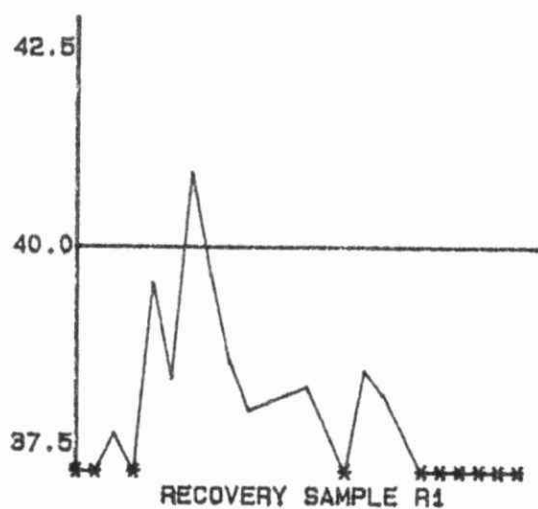
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check :	20	39.0	1.99
Digested Blank :	21	-1.7	6.80

QUALITY CONTROL GRAPHS OXYGEN DEMAND - CHEMICAL (MG/L AS O)

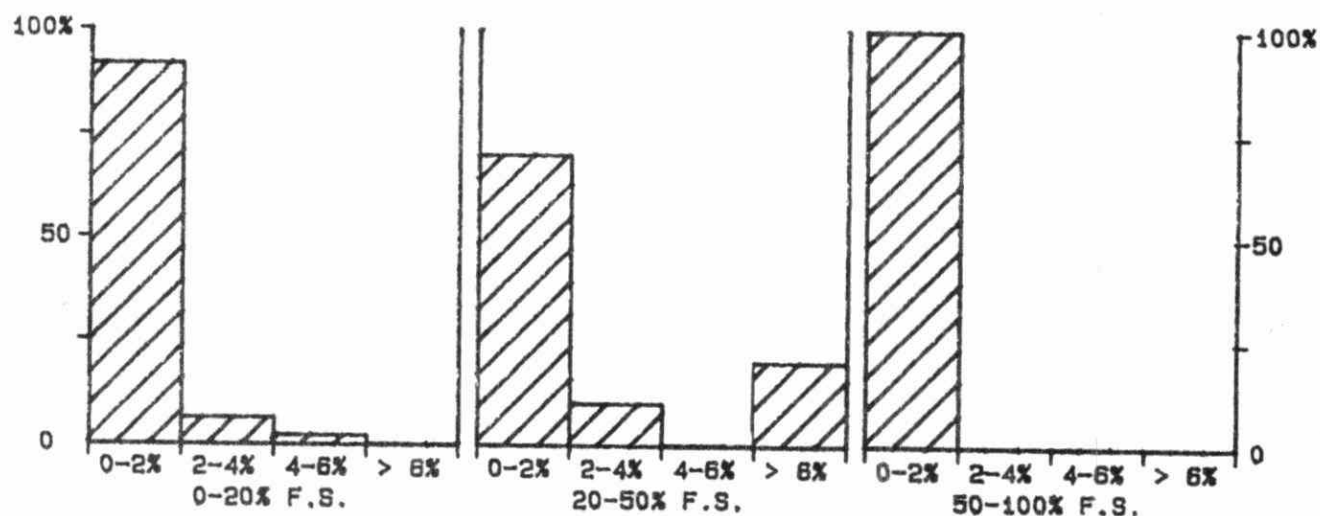
FROM: 06/01/86
TO: 24/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS O

*** OXYGEN - CHEMICAL DEMAND ***

IDENTIFICATION:

Laboratory : Colourimetry Method Introduced: 01/07/82
LIS Test Name Code: COD Units : mg/L as O
Work Station Code : SBCOD Unit Code : 064808
Method Code : 002AC0 Supervisor : M. Rawlings
Sample Type/Matrix: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents

SAMPLING:

Quantity Required: 25 mL
Container : Glass

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 150 C. Analysis is completed by automated colourimetric measurement of trivalent chromium.

Approximate absorbance: 0.6 at the full scale level

INSTRUMENTATION:

Culture tubes with Teflon closures; mechanical-convection oven
-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2 T value: 10

CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration : 2 digested standards, eg, QCA
Recovery : 2 digested standards, eg, R1
Drift : Undigested BL every 10 samples; bl, standard at end of run
Interference: Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

MODIFICATIONS:

30/06/82 -Manual COD procedure described in HAMES was discontinued.
Development report on the current procedure, described above, is available on request.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis are scheduled for completion within the week.

OXYGEN DEMAND - CHEMICAL
QUALITY CONTROL DATA FROM 21/01/86 TO 29/12/86

Lab: Colourimetry

Analytical Range: 10 to 500 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	37	400	393	-7	9.2
b :	37	100	104	4	8.5
a+b :	37	500	497	-3	13.4
a-b :	37	300	289	-11	11.7

s.d.(AB): Sw(within run): 8.3 S(between runs): 8.9 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

463 to 537 for A+B
 275 to 325 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	34	400	388	11.7
r2 :	34	100	98	8.8

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
37	0 - 50	4.7	24.4
10	50 - 100	10.5	15.8
6	100 - 250	15.7	8.9
5	250 - 500	23.8	7.8
58	Overall	10.4	N/A

STANDARD DEVIATION (s.dupl): 4.7

W value: 2

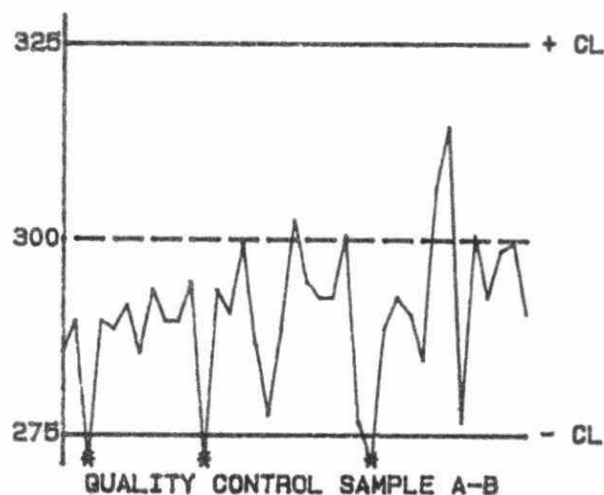
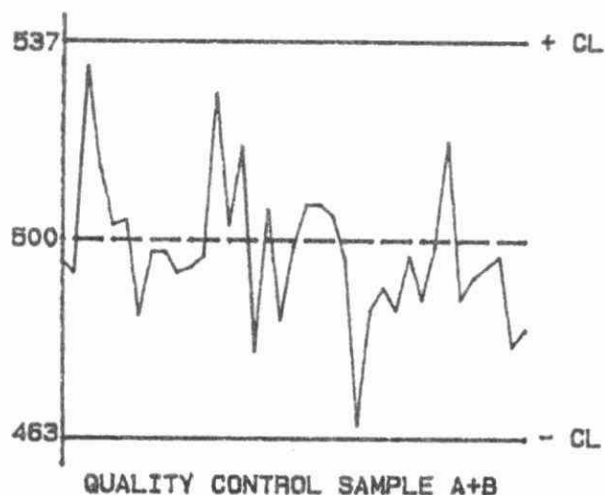
T value: 10

OTHER CHECKS:

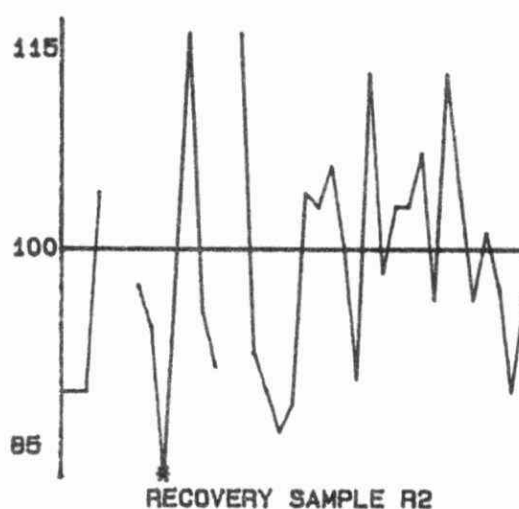
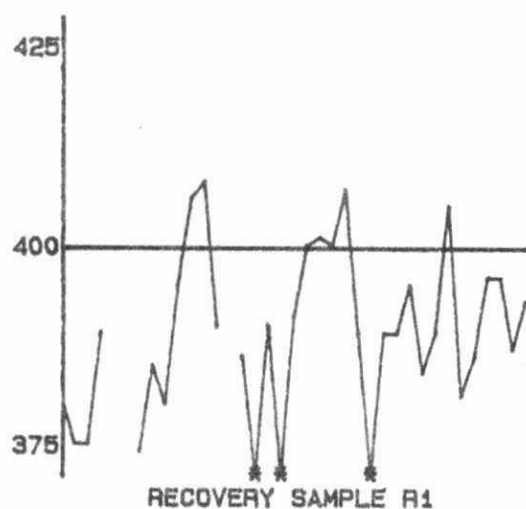
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check :	29	67	21.6
Digested Blank :	34	28	7.5

QUALITY CONTROL GRAPHS OXYGEN DEMAND - CHEMICAL (MG/L AS O)

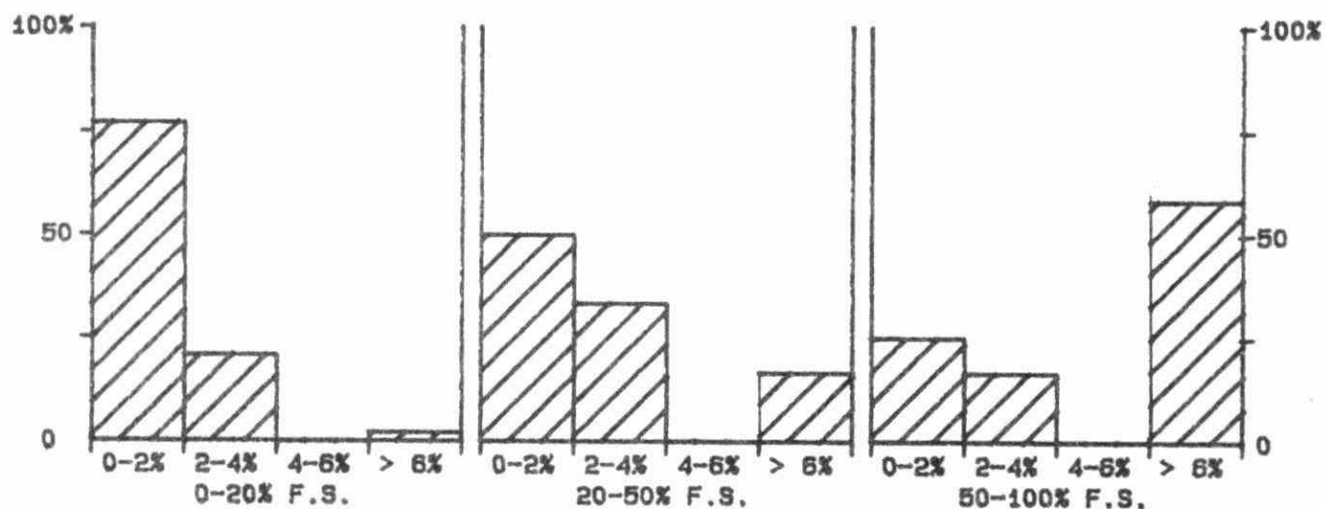
FROM: 21/01/86
TO: 29/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 MG/L AS O

*** PH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	01/01/76
LIS Test Name Code:	PH	Units	: dimensionless
Work Station Code	: DOCOP	Unit Code	: 000000
Method Code	: 0903PH	Supervisor	: F. Tomassini
Sample Type/Matrix:	Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required: 100 mL
Container : Polyethylene or BOD bottle filled to the brim/ screw caps
with cone-shaped liners

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (50 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.

N.B. Two performance reports follow: in the first, Acidity (Gran) was performed simultaneously, the second was a stand-alone pH work station.

INSTRUMENTATION

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus two standards, eg, QCA
Drift : 2 standard buffers -2 times daily

NOTES:

This method is used for manual pH measurements required for the DOCOP workstation.

SAMPLES FOR WHICH ACIDITY-GRAN WAS PERFORMED SIMUTANEOUSLY WERE DISCONTINUED AT THIS STATION AS OF 21/07/86, AND TRANSFERRED TO PHACD WORKSTATION.

PH
QUALITY CONTROL DATA FROM 03/01/86 TO 04/07/86

Lab: Dorset

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	37	6.86	6.86	0.00	0.024
b :	36	4.00	3.97	-0.03	0.032
a+b :	36	10.86	10.83	-0.03	0.043
a-b :	36	2.86	2.89	0.03	0.037

s.d.(AB): Sw(within run): 0.026 S(between runs): 0.028 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

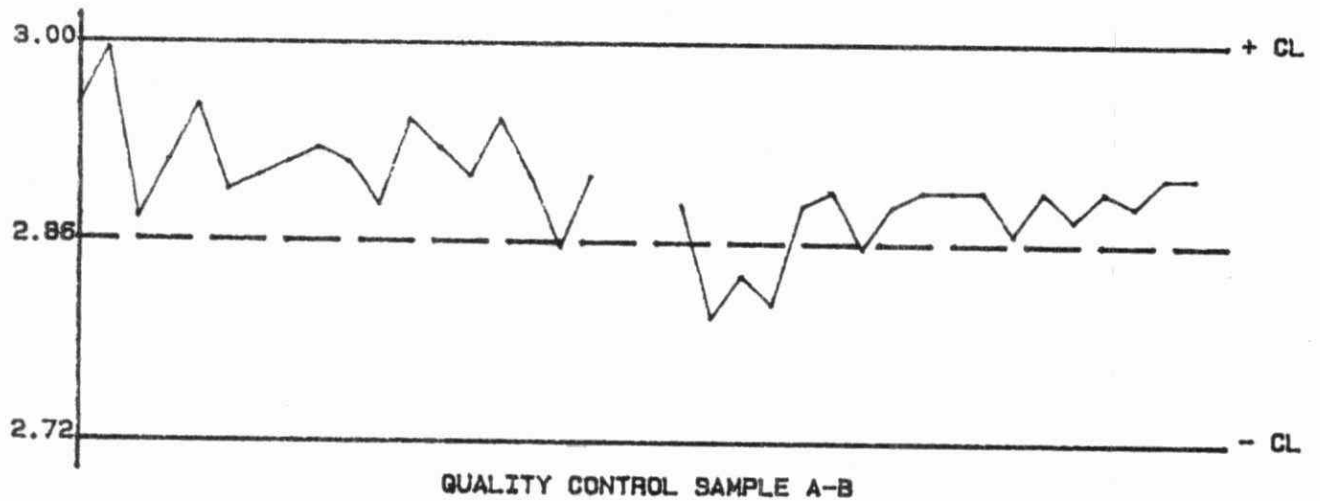
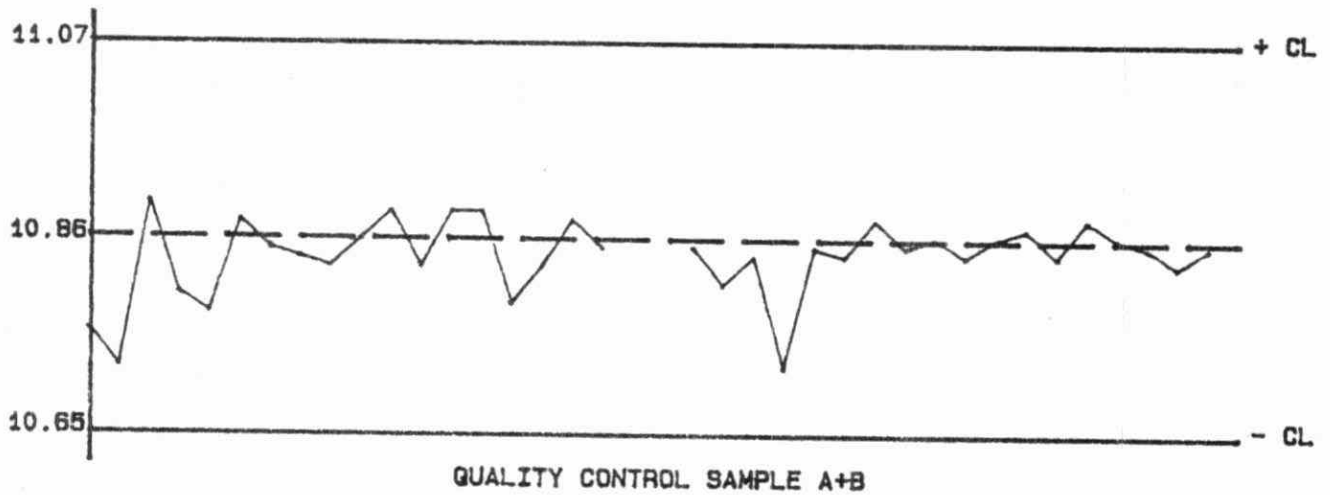
10.65 to 11.07 for A+B
2.72 to 3.00 for A-B

DUPLICATES:

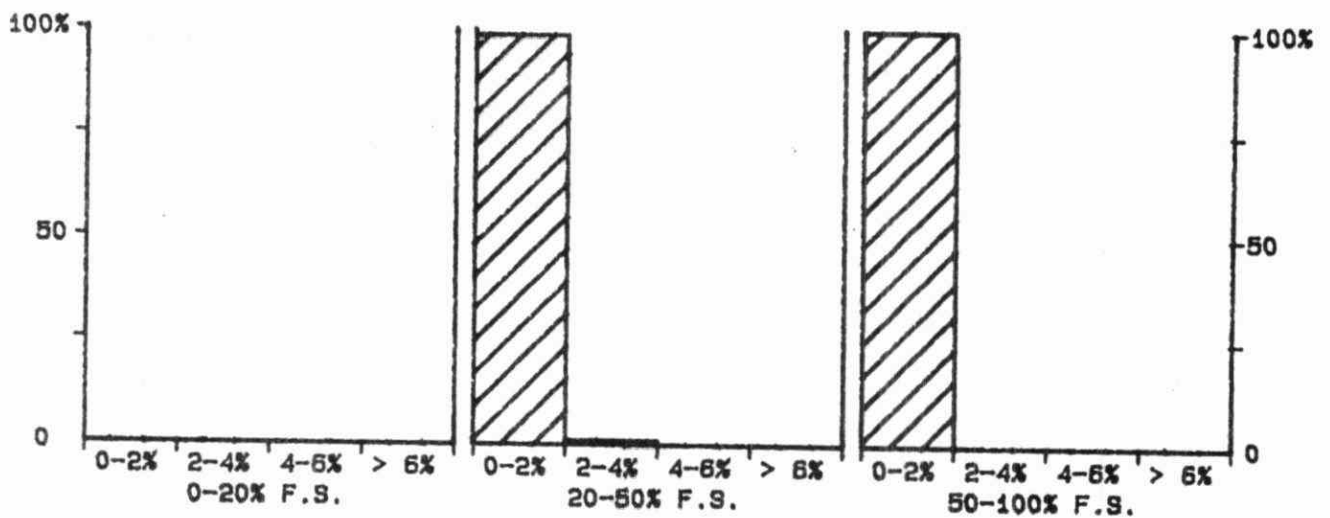
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
11	0.00 - 4.00	0.011	0.2
37	4.00 - 5.50	0.020	0.4
45	5.50 - 7.00	0.059	0.9
9	7.00 - 8.50	0.024	0.3
0	8.50 - 14.00	N/A	N/A
102	Overall	0.042	N/A

QUALITY CONTROL GRAPHS PH

FROM: 09/01/86
TO: 04/07/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	01/01/76
LIS Test Name Code:	PH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: 000000
Method Code	: 0902PH	Supervisor	: F. Tomassini
Sample Type/Matrix: Streams, Lakes, Precipitation			

SAMPLING:

Quantity Required: 250 mL
Container : Polyethylene or BOD bottle filled to the brim/ screw caps
with cone-shaped liners

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (100 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.
N.B. Alkalinity (Gran) was performed simultaneously.

INSTRUMENTATION

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: LTBL plus two standards, eg, QCA
Drift : 2 standard buffers -2 times daily

PH
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	237	6.86	6.86	0.00	0.032
b :	238	4.00	3.96	-0.04	0.032
a+b :	237	10.86	10.82	-0.04	0.046
a-b :	237	2.86	2.90	0.04	0.045

s.d.(AB): Sw(within run): 0.032 S(between runs): 0.032 S/Sw: 1.01

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.65 to 11.07 for A+B
2.72 to 3.00 for A-B

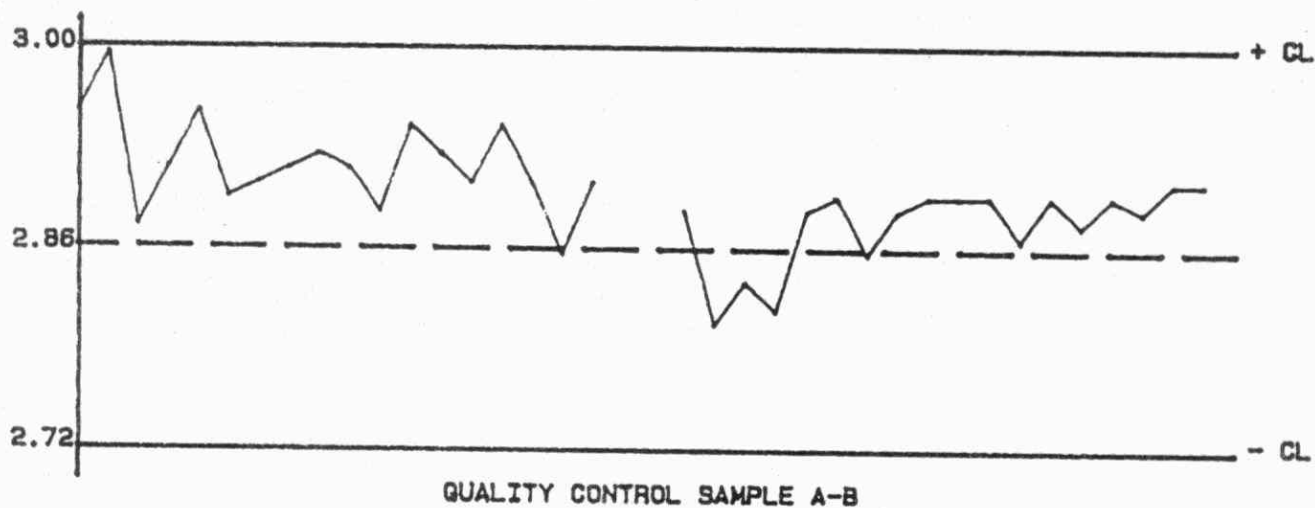
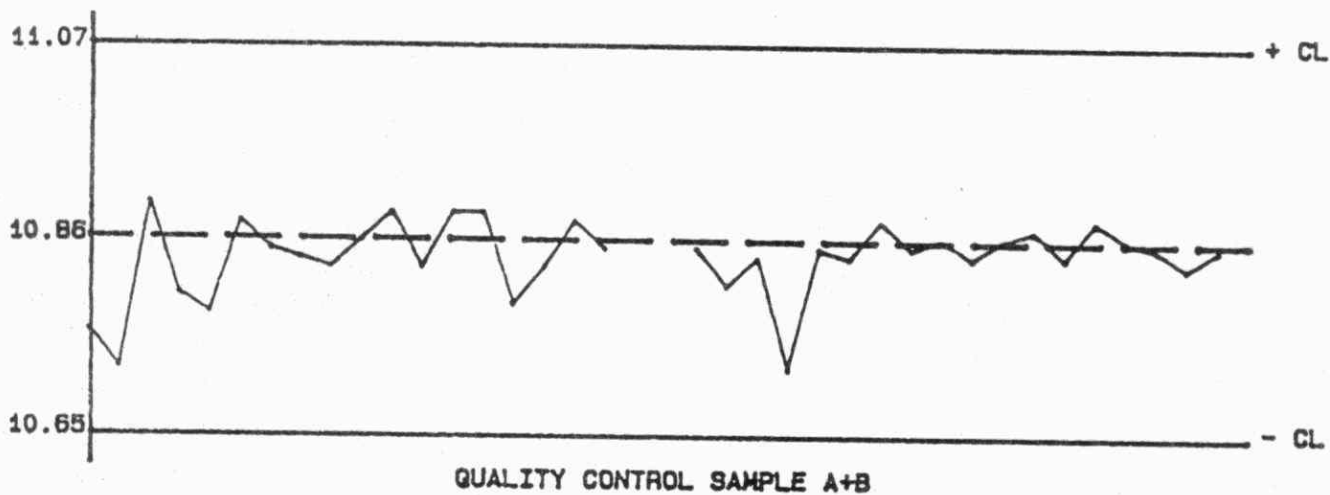
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 4.00	N/A	N/A
203	4.00 - 5.50	0.026	0.5
453	5.50 - 7.00	0.035	0.5
9	7.00 - 8.50	0.043	0.5
0	8.50 - 14.00	N/A	N/A
666	Overall	0.033	N/A

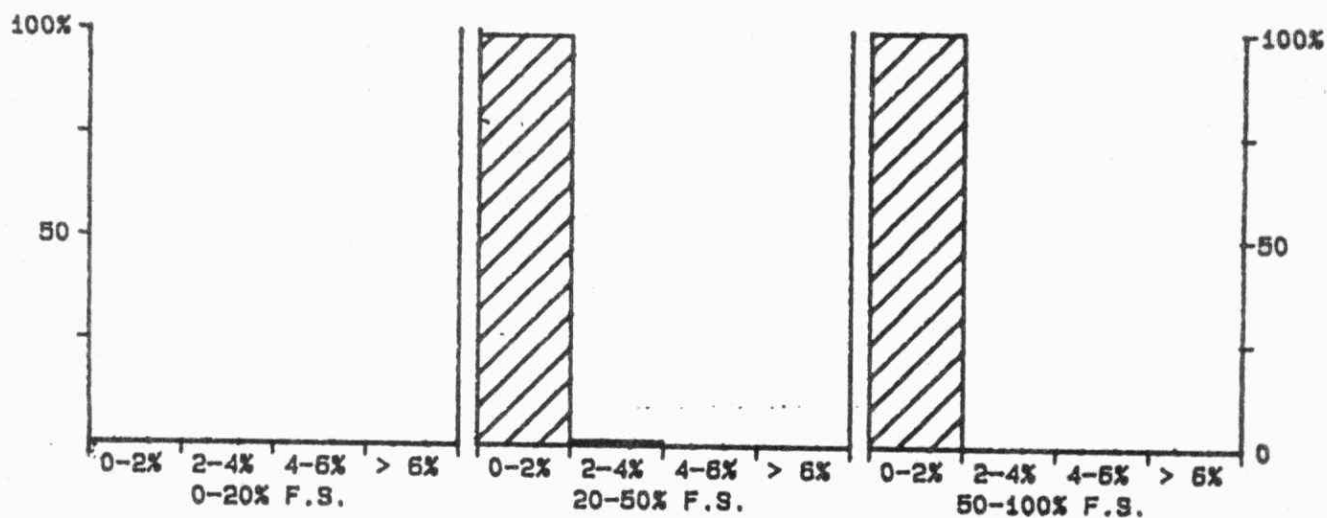
QUALITY CONTROL GRAPHS

PH

FROM: 09/01/86
TO: 04/07/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PH ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced:	Before '70
LIS Test Name Code:	PH	Units	: Dimensionless
Work Station Code	: SBPH	Unit Code	: Nil
Method Code	: 001A11	Supervisor	: P. Campbell
Sample Type/Matrix: Sewage, Industrial Waste, Effluents			

SAMPLING:

Quantity Required: 75 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (50 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, glass electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9.

CONTROLS:

Calibration: 2 standard buffers

PH
QUALITY CONTROL DATA FROM 02/01/86 TO 30/12/86

Lab: Solids and BOD

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	94	9.00	8.99	-0.01	0.030
b :	94	4.00	4.01	0.01	0.024
a+b :	94	13.00	13.00	0.00	0.030
a-b :	94	5.00	4.98	-0.02	0.045

s.d.(AB): Sw(within run): 0.032 S(between runs): 0.027 S/Sw: 0.85

On any given day the calibration is accepted if the values obtained lie within the ranges:

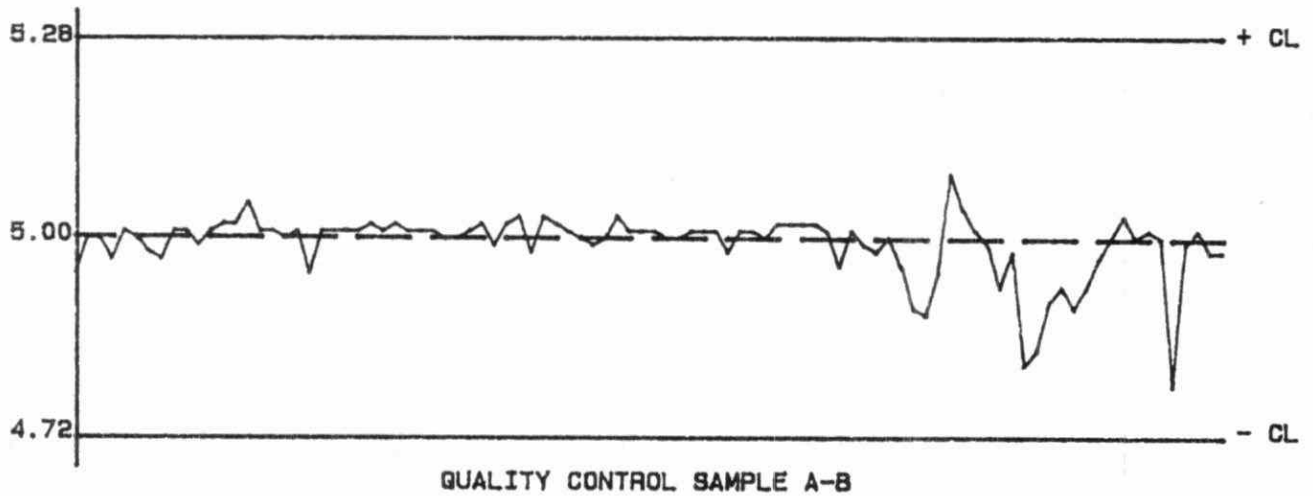
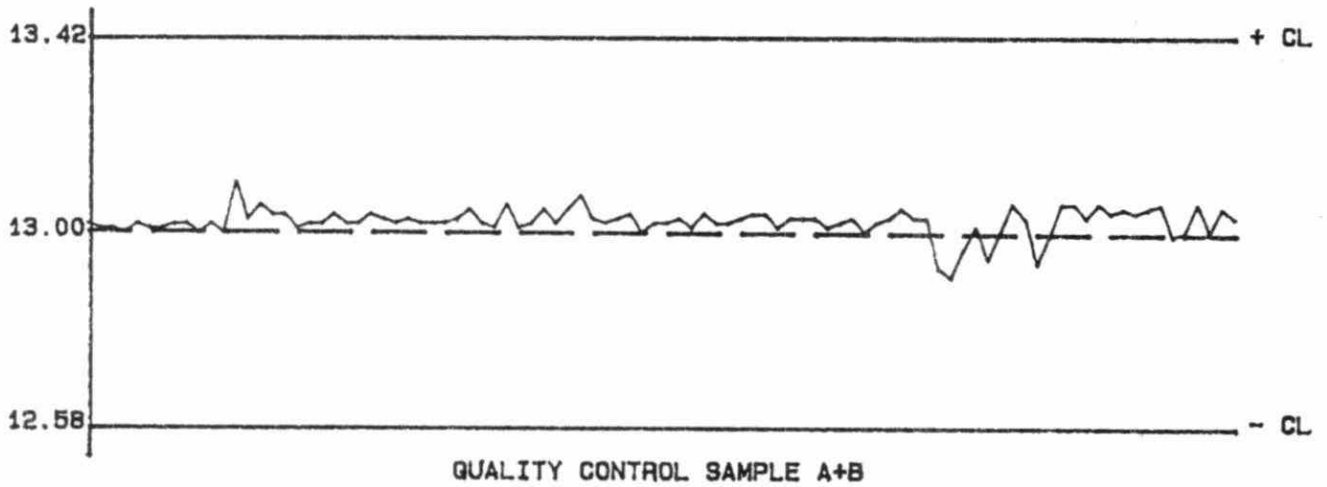
12.58 to 13.42 for A+B
4.72 to 5.28 for A-B

DUPLICATES:

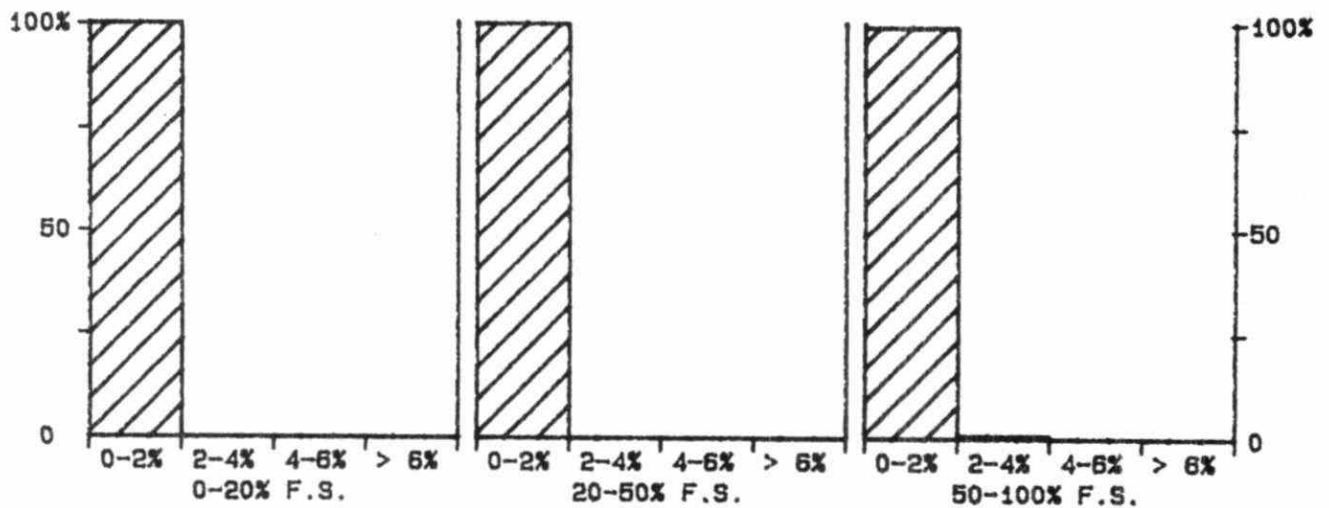
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
14	0.00 - 5.00	0.037	0.9
36	5.00 - 7.00	0.027	0.4
86	7.00 - 8.00	0.040	0.5
30	8.00 - 9.00	0.030	0.3
10	9.00 - 14.00	0.037	0.3
176	Overall	0.036	N/A

QUALITY CONTROL GRAPHS PH

FROM: 02/01/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PH ***

IDENTIFICATION:

Laboratory	: Titration Unit	Method Introduced:	01/05/78
LIS Test Name Code:	PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: Nil
Method Code	: 002A11	Supervisor	: P. Campbell
Sample Type/Matrix: Precipitation, Throughfall, Stemflow			

SAMPLING:

Quantity Required: 15 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.
N.B. Gran and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : LTBL plus two standards, eg, QCA

MODIFICATIONS:

01/04/82 -Sample volume was decreased from 100.0 to 10.0 mL.
01/05/83 -System was fully automated by introduction of a sampler, and an automated device for washing the electrode between analyses.
30/05/86 -Direct Computer input (DCI) to the Laboratory Information System (LIS) was introduced.

PH
QUALITY CONTROL DATA FROM 03/01/86 TO 22/12/86

Lab: Titration

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	123	6.86	6.86	0.00	0.006
b :	123	4.01	4.01	-0.00	0.005
a+b :	123	10.87	10.87	-0.00	0.010
a-b :	123	2.85	2.86	0.01	0.006

s.d.(AB): Sw(within run): 0.004 S(between runs): 0.006 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.76 to 10.97 for A+B
2.78 to 2.92 for A-B

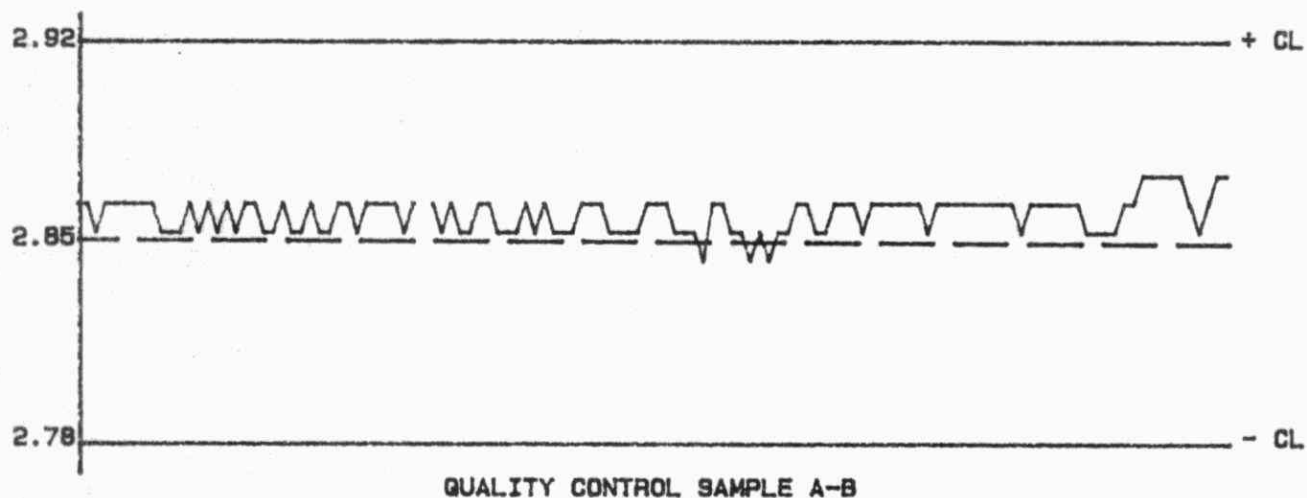
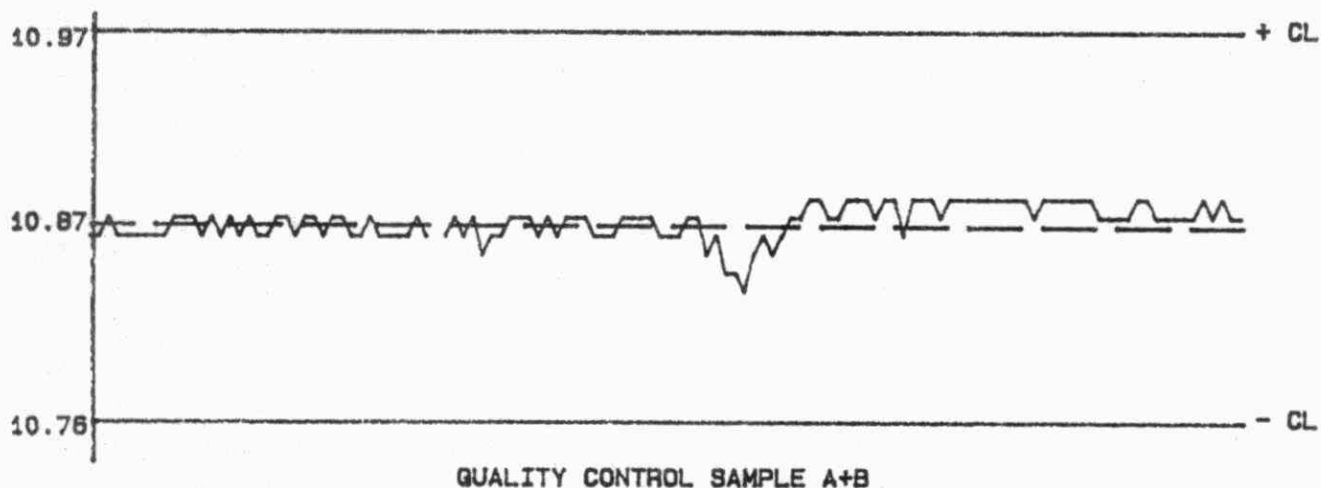
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 3.00	N/A	N/A
31	3.00 - 4.00	0.021	0.5
251	4.00 - 5.00	0.023	0.5
61	5.00 - 7.00	0.069	1.2
8	7.00 - 14.00	0.058	0.7
351	Overall	0.037	N/A

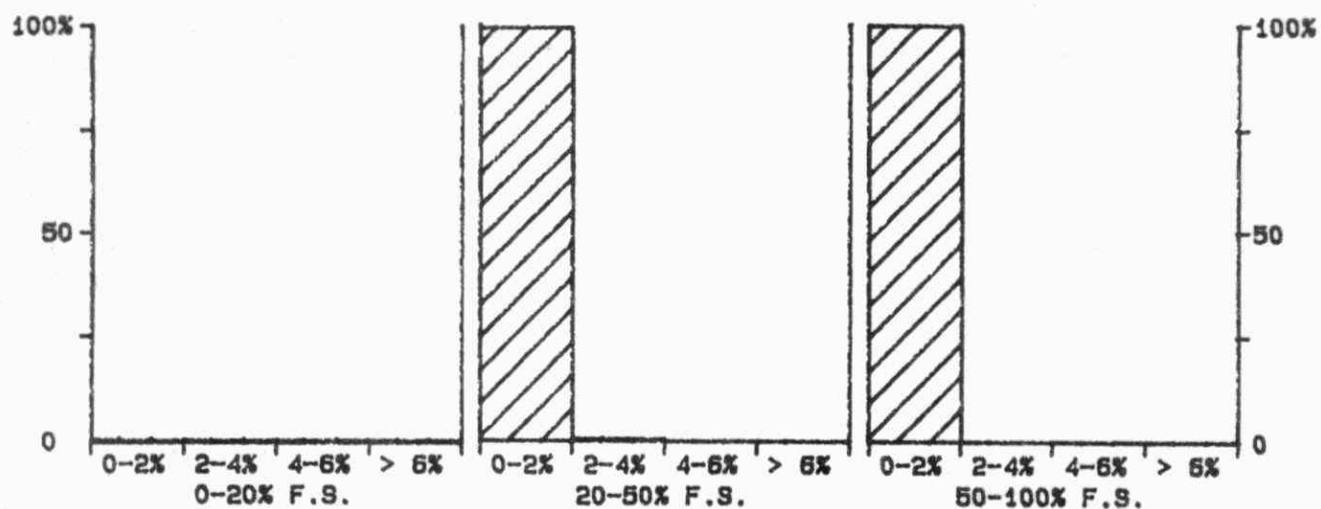
QUALITY CONTROL GRAPHS

PH

FROM: 03/01/86
TO: 22/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	09/07/80
LIS Test Name Code:	PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: Nil
Method Code	: 003A12	Supervisor	: P. Campbell
Sample Type/Matrix:	Rivers, Lakes		

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.
N.B. Gran alkalinity, total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

RATS: Automated titration system with microcomputer control and data processing.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: 2 "standards", eg, QCA

Drift : In run standard, throughout run, diluted tap water (20% V/V)

MODIFICATIONS:

02/03/84 -QC program at this workstation was expanded to include pH and total fixed endpoint alkalinity. Preparation and storage of QC solutions was modified. As shown by the following QCA-B data, the attempt to check pH calibrations by monitoring the pH values of the dilute alkalinity standards failed. Buffers will be utilized in '85.

16/03/84 -Use of 4 oz. polyethylene bottles plus screw caps with cone-shaped liners was recommended for sampling.

09/05/85 -RATS- River Automated Titration System. Designed for the determination of conductivity, pH, alkalinity - total fixed endpoint and alkalinity - Gran. The system is microcomputer controlled with data reduction and direct computer (DCI) capabilities.

PH
QUALITY CONTROL DATA FROM 03/01/86 TO 31/12/86

Lab: Titration

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	121	4.45	4.48	0.03	0.025
b :	121	3.73	3.73	0.00	0.027
a+b :	121	8.18	8.21	0.03	0.042
a-b :	121	0.72	0.75	0.03	0.031

s.d.(AB): SW(within run): 0.022 S(between runs): 0.026 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

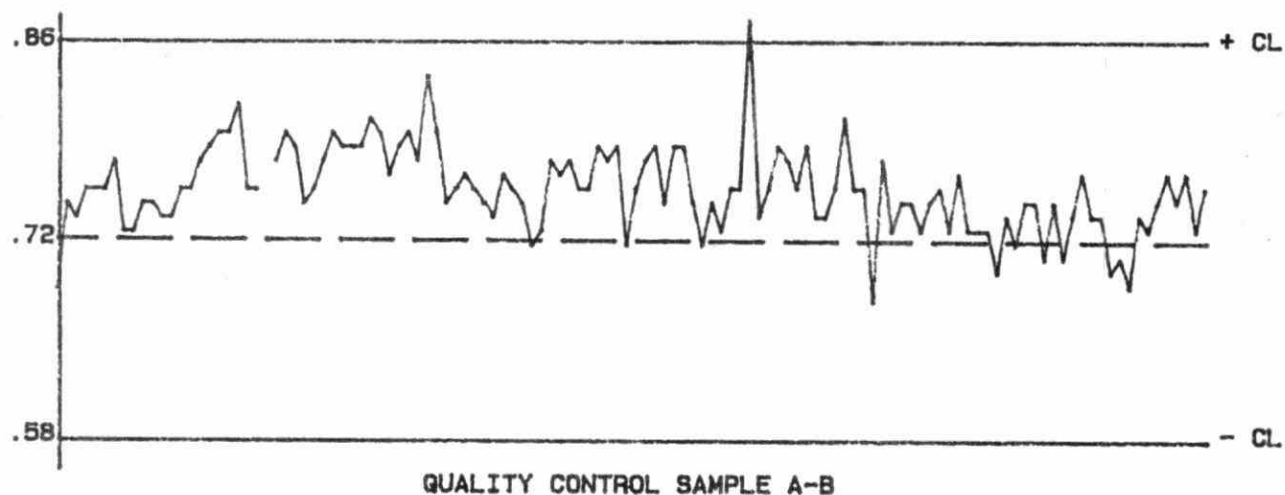
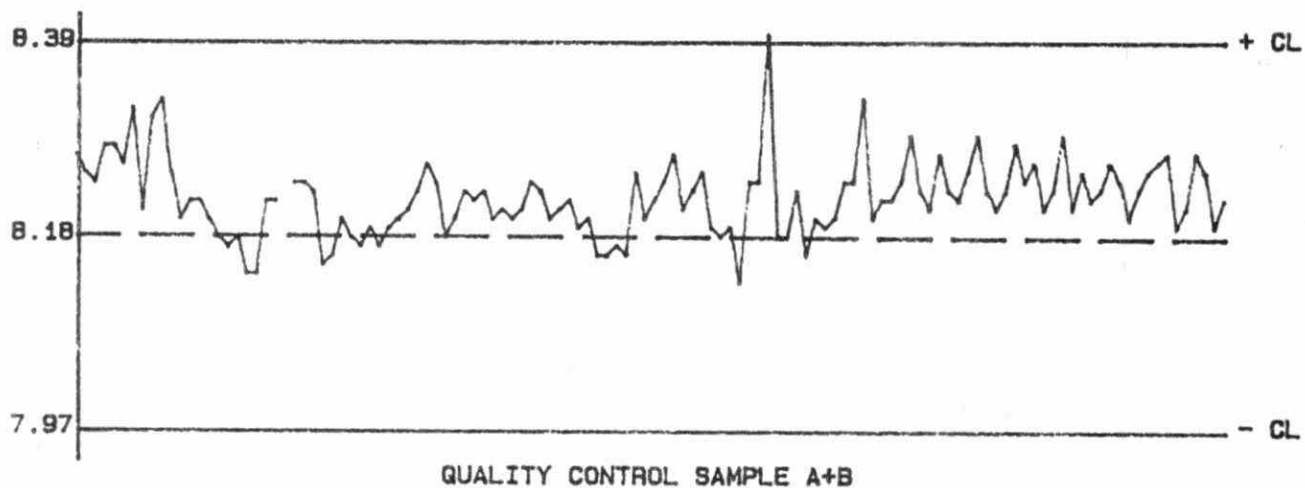
7.97 to 8.39 for A+B
0.58 to 0.86 for A-B

DUPLICATES:

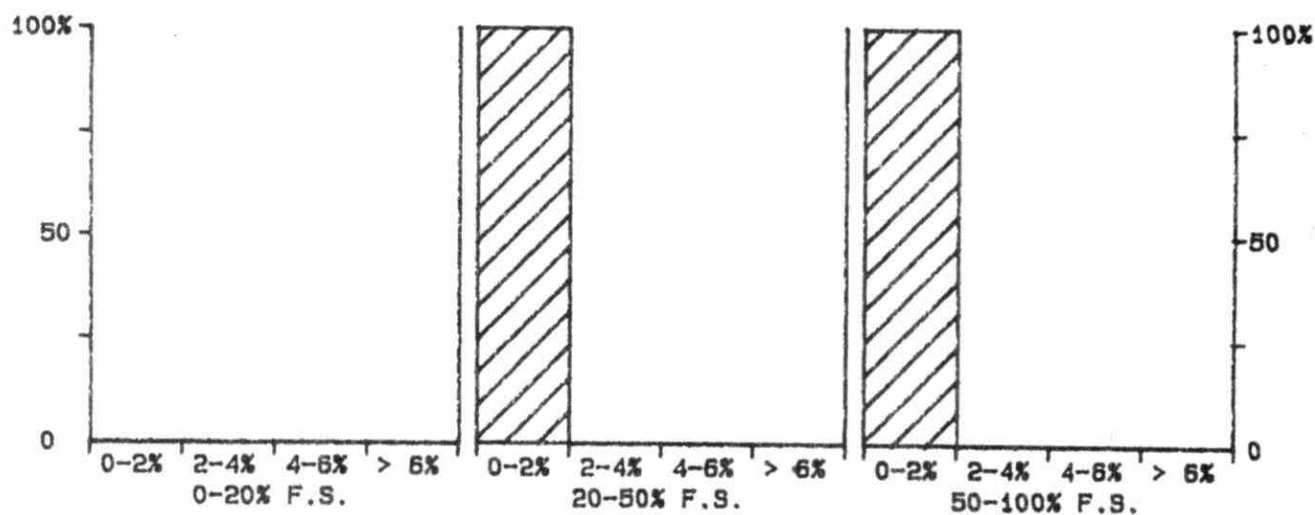
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
3	0.00 - 5.00	0.049	1.0
3	5.00 - 6.00	0.054	0.9
41	6.00 - 7.00	0.058	0.8
255	7.00 - 9.00	0.059	0.7
3	9.00 - 14.00	0.047	0.5
305	Overall	0.059	N/A

QUALITY CONTROL GRAPHS PH

FROM: 03/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PII ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	09/07/80
LIS Test Name Code:	PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: Nil
Method Code	: 003A12	Supervisor	: P. Campbell
Sample Type/Matrix:	Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required: 30 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

PH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Sludges are centrifuged before analysis.

N.B. Total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

WATS: Automated titration system with microcomputer control and data processing,

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration: 2 "standards", eg, QCA
Drift : In run standard, throughout run, diluted tap water (50% V/V)

MODIFICATIONS:

14/03/86 WATS workstation was introduced. This system was designed to determine pH, conductivity and total fixed endpoint alkalinity; it is microcomputer controlled and has direct computer (DCI) capabilities.

PH
QUALITY CONTROL DATA FROM 14/03/86 TO 05/12/86

Lab: Titration

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	90	9.18	9.19	0.01	0.034
b :	90	4.45	4.48	0.03	0.041
a+b :	90	13.63	13.67	0.04	0.064
a-b :	90	4.73	4.72	-0.01	0.040

s.d.(AB): SW(within run): 0.028 S(between runs): 0.038 S/SW: 1.33

On any given day the calibration is accepted if the values obtained lie within the ranges:

13.42 to 13.84 for A+B
4.59 to 4.87 for A-B

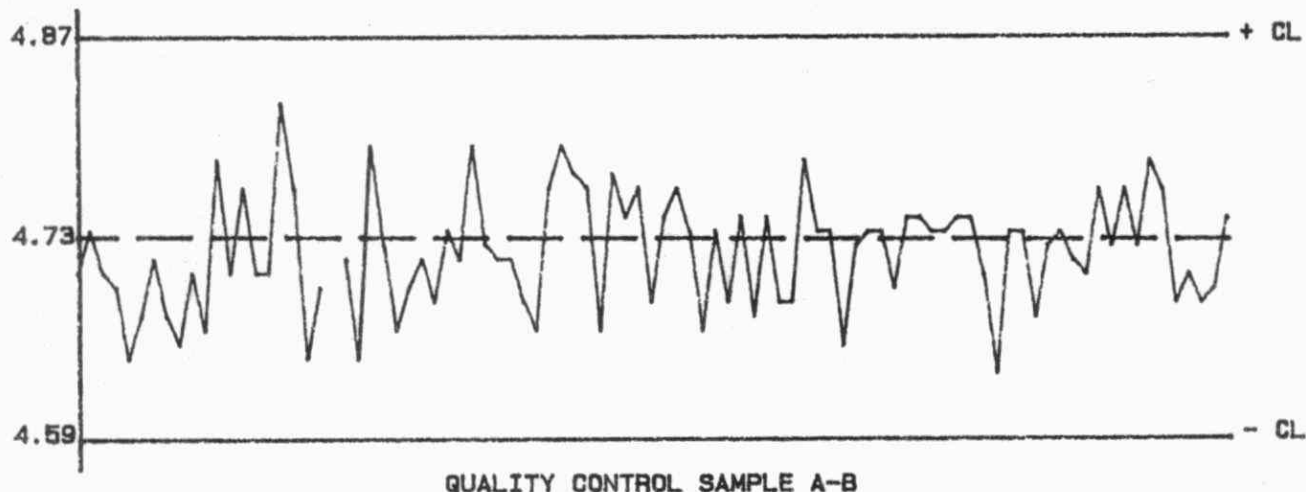
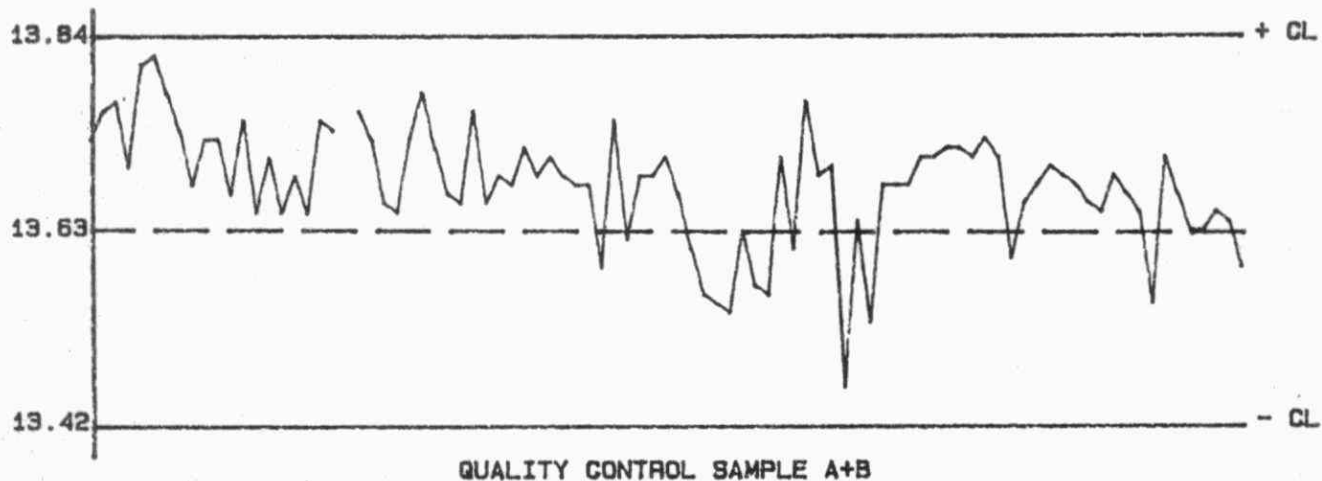
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.00 - 5.00	N/A	N/A
1	5.00 - 6.00	N/A	N/A
5	6.00 - 7.00	0.070	1.0
177	7.00 - 9.00	0.066	0.8
1	9.00 - 14.00	N/A	N/A
185	Overall	0.066	N/A

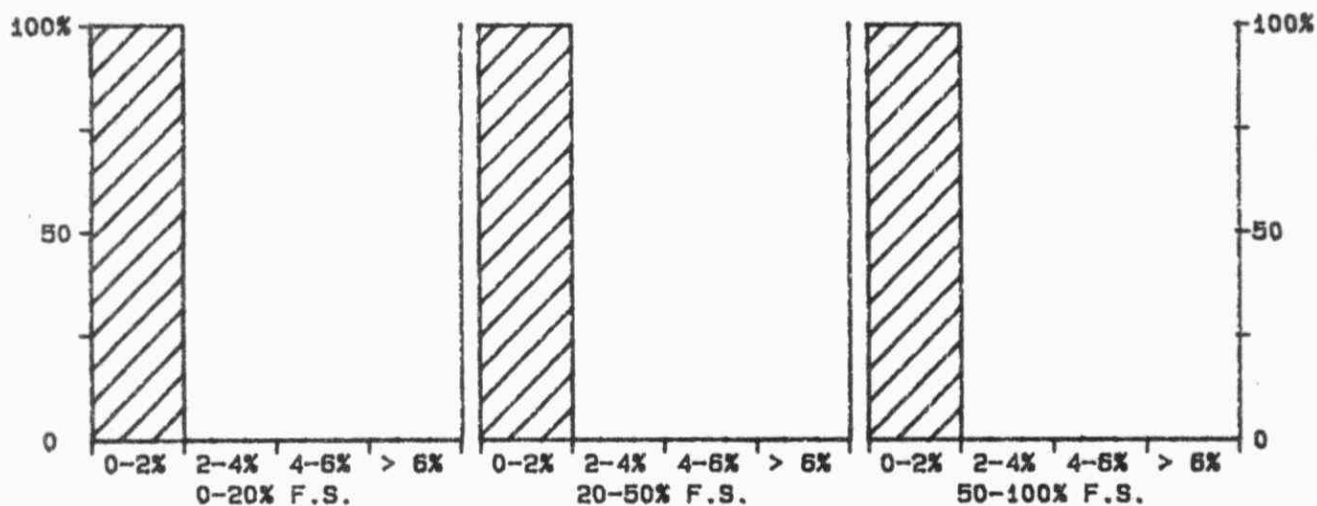
QUALITY CONTROL GRAPHS

PH

FROM: 14/03/86
TO: 05/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced:	09/07/80
LIS Test Name Code:	PH	Units	: Dimensionless
Work Station Code	: WPC	Unit Code	: Nil
Method Code	: 001A11	Supervisor	: P. Campbell
Sample Type/Matrix: Domestic Waters, Leachates, Effluents			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, glass electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 8.

CONTROLS:

Calibration: 2 buffers, eg, QCA

MODIFICATIONS:

14/03/86

-THIS TEST PROCEDURE WAS AUTOMATED, AND ASSIGNED TO THE WATS WORKSTATION. SEE PH AT WATS WORKSTATION FOR STATISTICS.

PH
QUALITY CONTROL DATA FROM 08/01/86 TO 12/12/86

Lab: Dorset

Analytical Range: 0.00 to 14.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	105	6.86	6.86	0.00	0.021
b :	105	4.00	3.96	-0.04	0.063
a+b :	105	10.86	10.82	-0.04	0.069
a-b :	105	2.86	2.90	0.04	0.063

s.d.(AB): Sw(within run): 0.045 S(between runs): 0.047 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

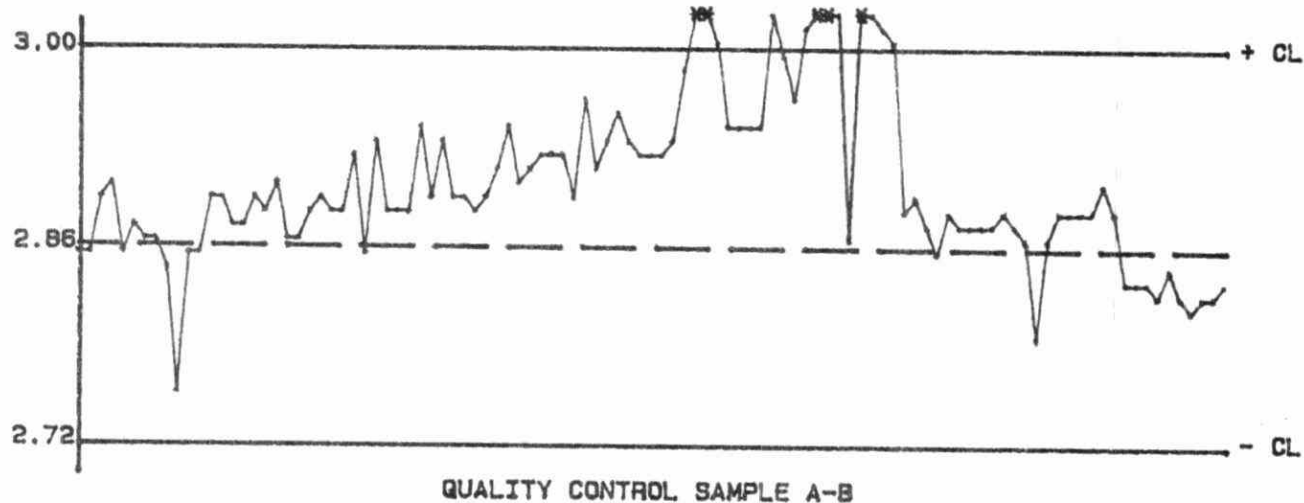
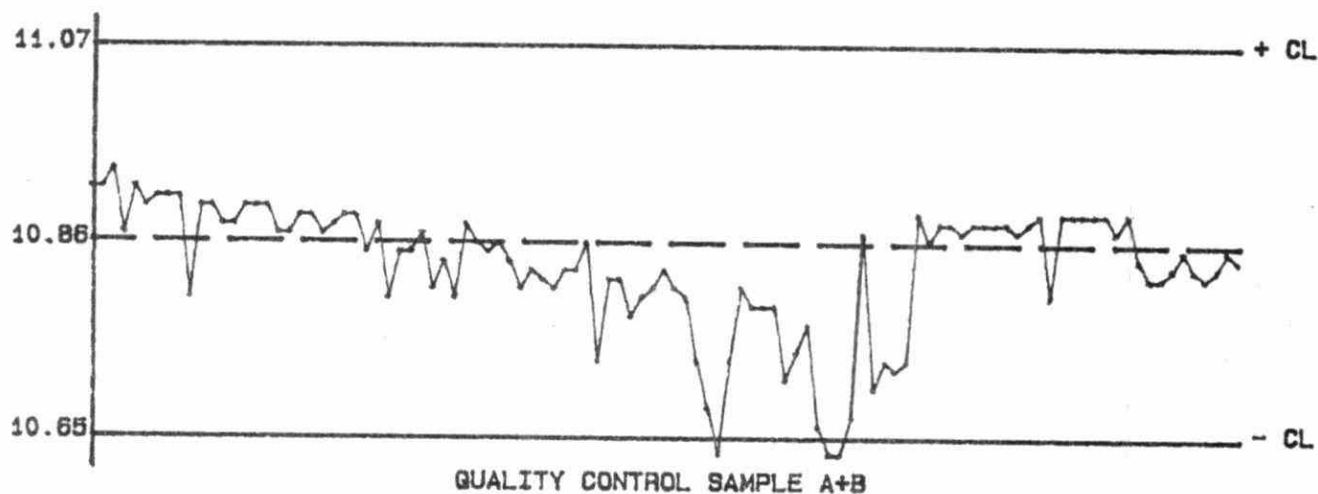
10.65 to 11.07 for A+B
2.72 to 3.00 for A-B

DUPLICATES:

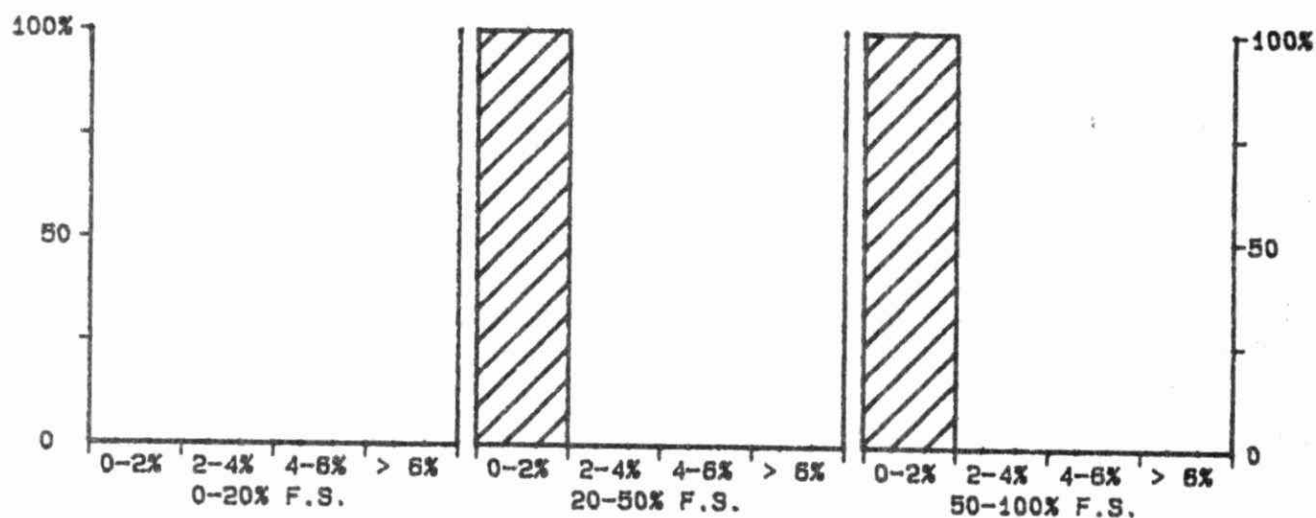
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0.00 - 4.00	N/A	N/A
42	4.00 - 5.50	0.036	0.6
213	5.50 - 7.00	0.021	0.3
13	7.00 - 8.50	0.028	0.3
0	8.50 - 14.00	N/A	N/A
268	Overall	0.024	N/A

QUALITY CONTROL GRAPHS PH

FROM: 08/01/86
TO: 12/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 14

*** PH - SOIL (Xca) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	PHECA	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: 000000
Method Code	: 304AB1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 20 g (dry <2 mm).
Container : glass or polystyrene jars

SAMPLE PREPARATION:

Air dry (<2 mm).

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. PH is measured on the supernatant.

INSTRUMENTATION:

Corning pH/ion meter 150
Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers plus 3 standards, eg, QCA
Recovery : 2 long term soil samples plus a round robin CSSC sample

MODIFICATION:

01/10/80 -Radiometer PHM62 replaced Fisher pH meter.
01/05/84 -Corning pH/ion meter 150 replaced Radiometer PHM62.
01/02/84 -Samples are agitated for 20 minutes in a tube as opposed to being stirred intermittently in a beaker for 30 minutes.

PH - SOIL (Xca)
QUALITY CONTROL DATA FROM 14/03/86 TO 05/12/86

Lab: Dorset Soils

Analytical Range: 0.05 to 9.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	18	4.00	4.01	0.01	0.027
b :	18	6.00	6.00	-0.00	0.023
a+b :	18	10.00	10.00	0.00	0.042
a-b :	18	-2.00	-2.79	0.01	0.027
c :	18	6.00	6.00	-0.00	0.023
d :	18	7.00	7.01	0.01	0.008
c+d :	18	13.00	13.81	0.01	0.023
c-d :	18	-0.20	-0.22	-0.02	0.025

s.d.(AB): SW(within run): 0.019 S(between runs): 0.025 S/SW: 1.31
s.d.(CD): SW(within run): 0.018 S(between runs): 0.017 S/SW: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.65 to 10.95 for A+B
-2.90 to -2.70 for A-B
13.65 to 13.95 for C+D
-0.30 to -0.10 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	18	4.10	4.25	0.060
r2 :	17	4.51	4.54	0.080

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
33	3.00 - 5.00	0.013	0.3
4	5.00 - 7.00	0.035	0.5
1	7.00 - 9.00	N/A	N/A
38	Overall	0.017	N/A

STANDARD DEVIATION (s.dupl): 0.013 W value: 0.01 T value: 0.05

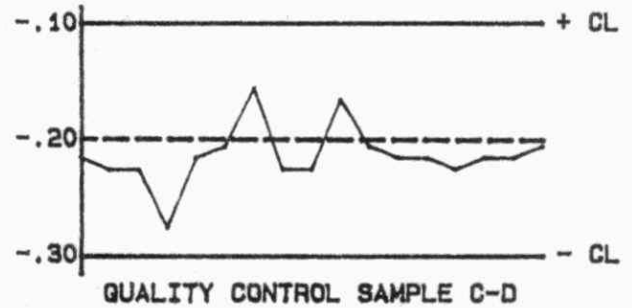
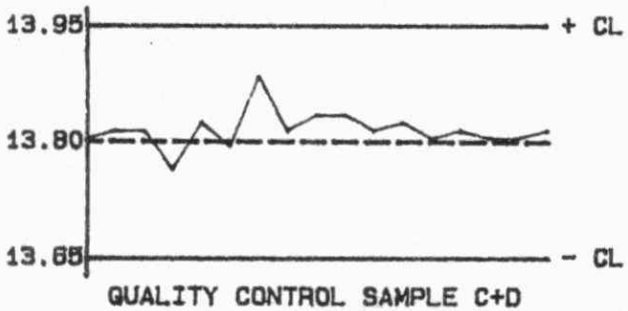
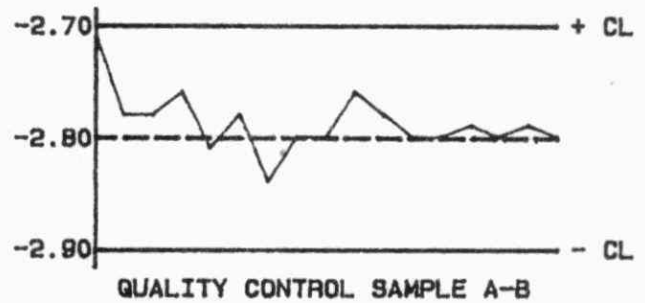
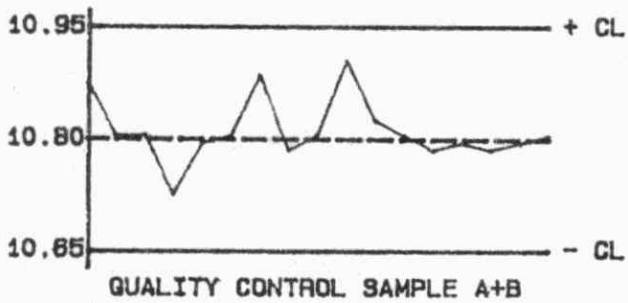
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
slope :	18	57.99	0.639

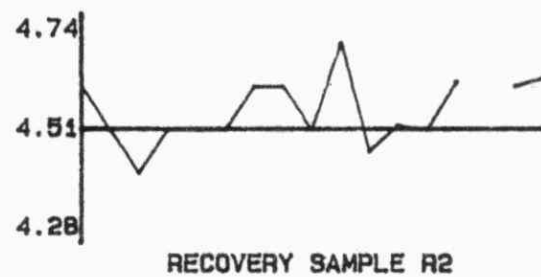
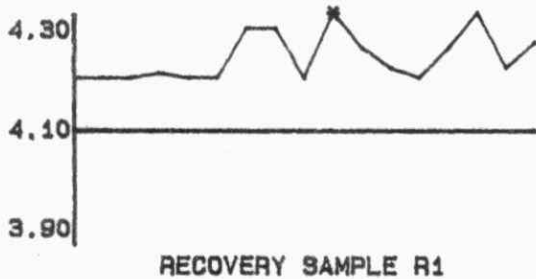
QUALITY CONTROL GRAPHS

PH - SOIL (XCA)

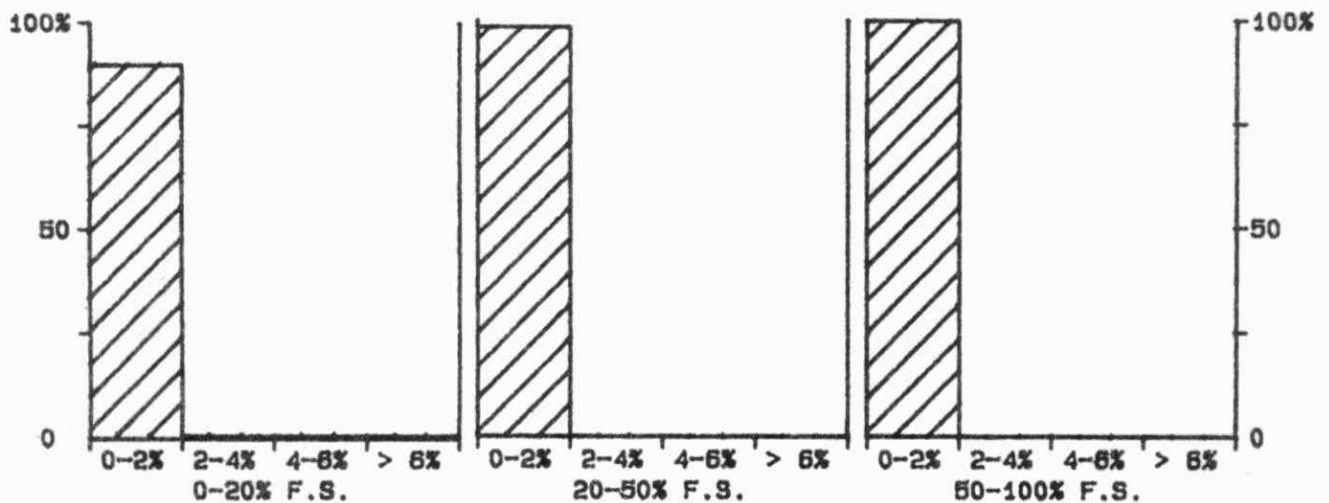
FROM: 14/03/86
TO: 09/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** PH - SOIL (Xw) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	PHEW	Units	: dimensionless
Work Station Code	: DOSOILPH	Unit Code	: 000000
Method Code	: 304AB1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 20 g (dry <2 mm).
Container : glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

Ten grams of sample (<2 mm) plus 20 mL of deionized water for 20 minutes. The mixture is removed and allowed to equilibrate for 30 minutes. PH is measured on the supernatant.

INSTRUMENTATION:

Corning pH/ion meter 150
Corning Combination X-EL electrode balance accurate to 0.001 g.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : 3 buffers plus 3 standards, eg, QCA
Recovery : 2 long term soil samples plus a round robin CSSC sample

MODIFICATION:

01/10/80 -Radiometer PHM62 replaced Fisher pH meter.
01/05/84 -Corning pH/ion meter 150 replaced Radiometer PHM62.
01/02/84 -Samples are agitated for 20 minutes in a tube as opposed to being stirred intermittently in a beaker for 30 minutes.

PH - SOIL (Xw)
QUALITY CONTROL DATA FROM 14/03/86 TO 09/12/86

Lab: Dorset Soils

Analytical Range: 0.1 to 9.00

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	15	4.00	4.01	0.01	0.024
b :	15	6.80	6.79	-0.01	0.023
a+b :	15	10.80	10.80	-0.00	0.038
a-b :	15	-2.80	-2.79	0.01	0.028
c :	15	6.80	6.79	-0.01	0.023
d :	15	7.00	7.02	0.02	0.007
c+d :	15	13.80	13.81	0.01	0.025
c-d :	15	-0.20	-0.22	-0.02	0.024

s.d.(AB): SW(within run): 0.020 S(between runs): 0.024 S/Sw: 1.19
s.d.(CD): SW(within run): 0.017 S(between runs): 0.017 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.65 to 10.95 for A+B
-2.90 to -2.70 for A-B
13.65 to 13.95 for C+D
-0.30 to -0.10 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	15	4.45	4.59	0.090
r2 :	15	5.35	5.34	0.068

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	3.00 - 5.00	0.046	1.0
13	5.00 - 7.00	0.037	0.6
2	7.00 - 9.00	0.050	0.6
30	Overall	0.043	N/A

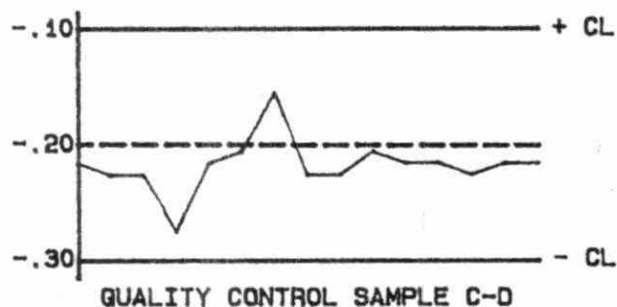
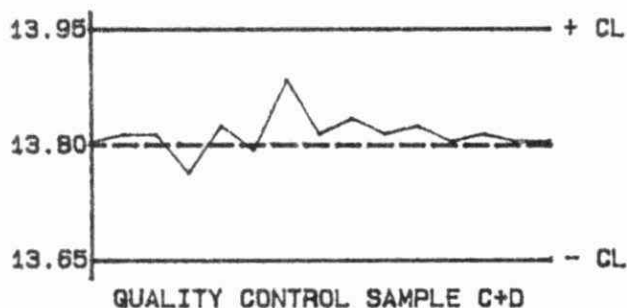
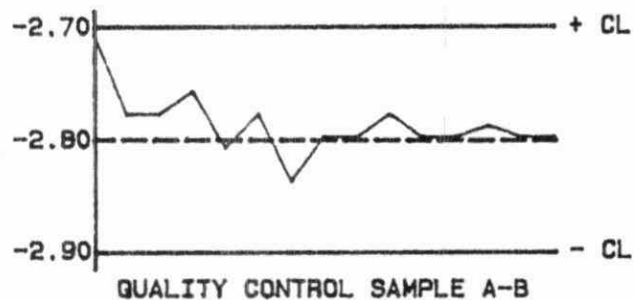
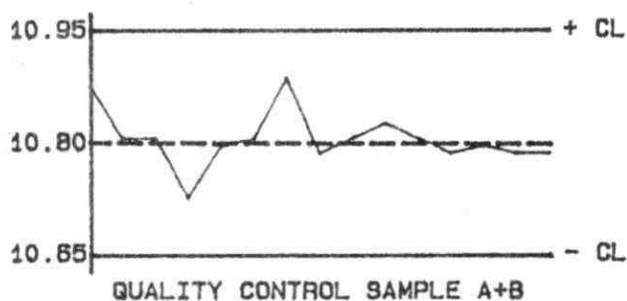
STANDARD DEVIATION (s.dupl): 0.046 W value: 0.02 T value: 0.1

OTHER CHECKS:

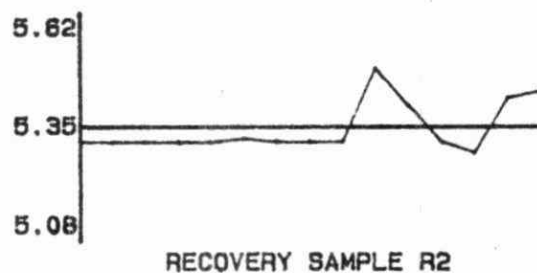
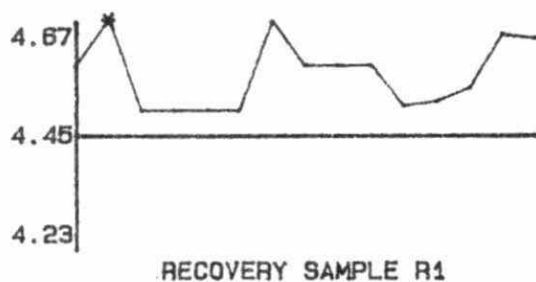
	Number of Data	Data Mean	Standard(1) Deviation
slope :	15	58.14	0.584

QUALITY CONTROL GRAPHS PH - SOIL (XW)

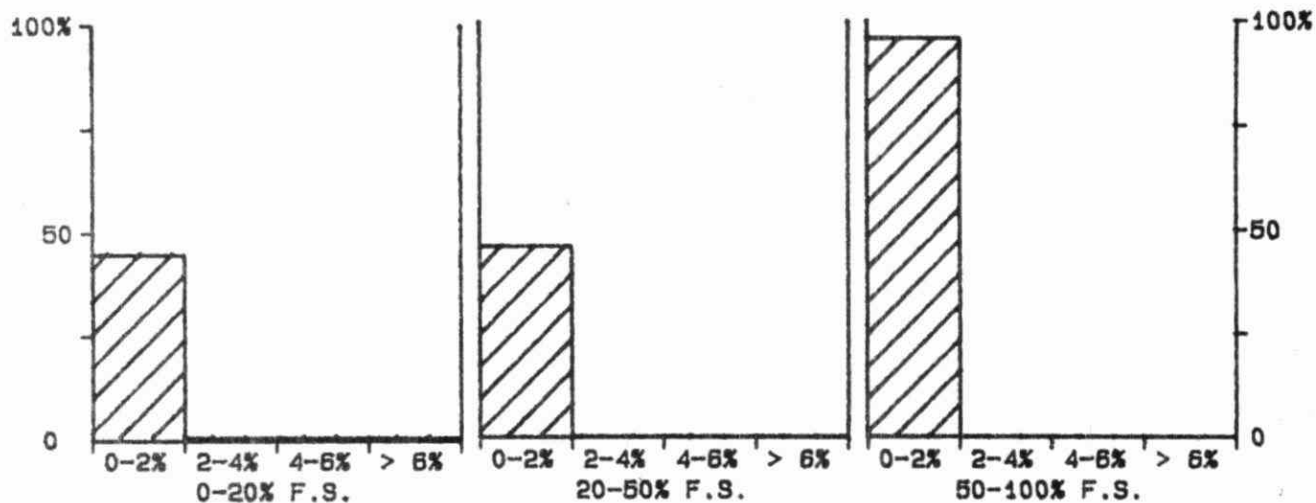
FROM: 14/03/86
TO: 09/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** PHENOLICS - REACTIVE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/74
LIS Test Name Code:	PHNOL	Units	: ug/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes			

SAMPLING:

Quantity Required: 250 mL
Container : Glass
Preservative : Copper sulphate-phosphoric acid
Other : Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.
Approximate absorbance: 0.03 at the full scale level

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL, standard, BL every 10 samples

NOTES:

A report identifying reactive phenolics is available on request.

PHENOLICS - REACTIVE
QUALITY CONTROL DATA FROM 03/01/86 TO 18/12/86

Lab: Colourimetry

Analytical Range: 1 to 50.0 ug/L as PHENOL

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	92	40.0	39.8	-0.2	0.38
b :	93	10.0	10.3	0.3	0.24
a+b :	92	50.0	50.1	0.1	0.54
a-b :	92	30.0	29.5	-0.5	0.33

s.d.(AB): Sw(within run): 0.23 S(between runs): 0.32 S/Sw: 1.36

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8 to 52.2 for A+B
28.5 to 31.5 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	138	0.0 - 5.0	0.32	30.4
	9	5.0 - 10.0	0.47	6.6
	5	10.0 - 25.0	1.12	8.7
	2	25.0 - 50.0	0.74	2.0
	154	Overall	0.39	N/A

STANDARD DEVIATION (s.dup1): 0.32

W value: 0.2

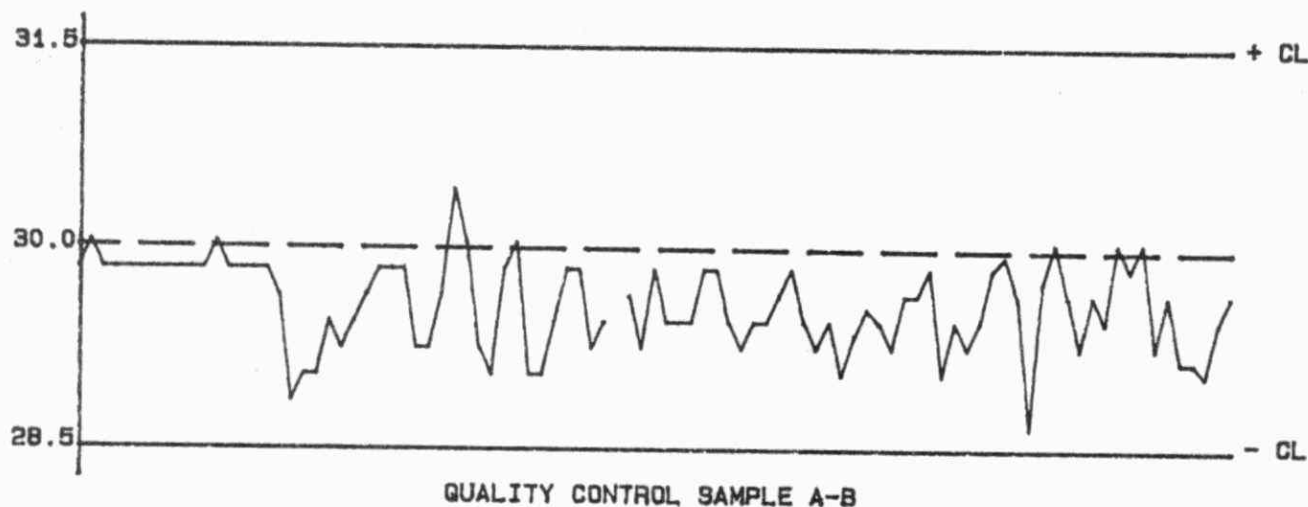
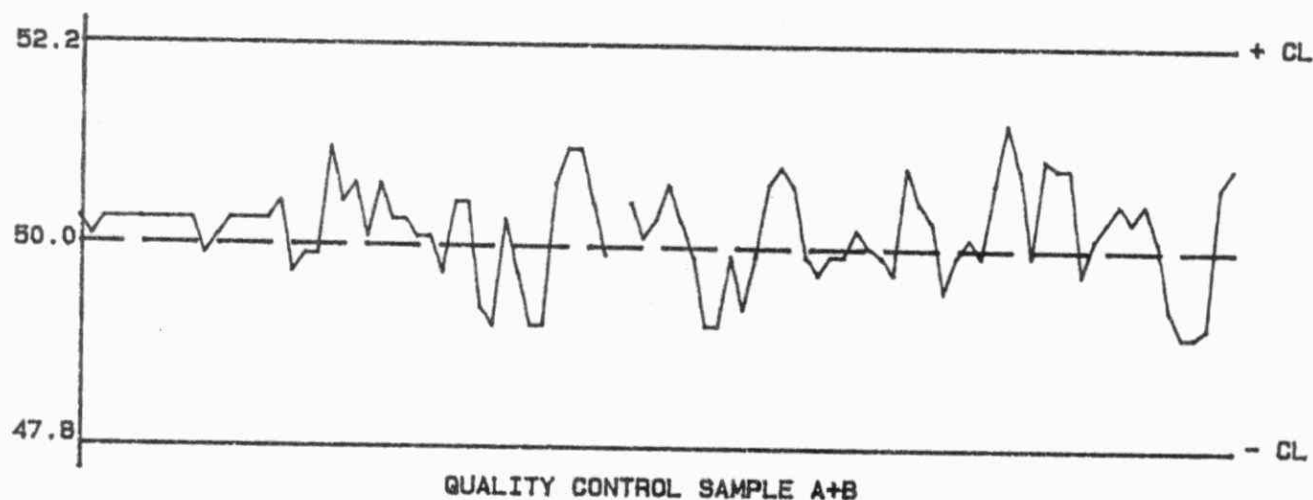
T value: 1

OTHER CHECKS:

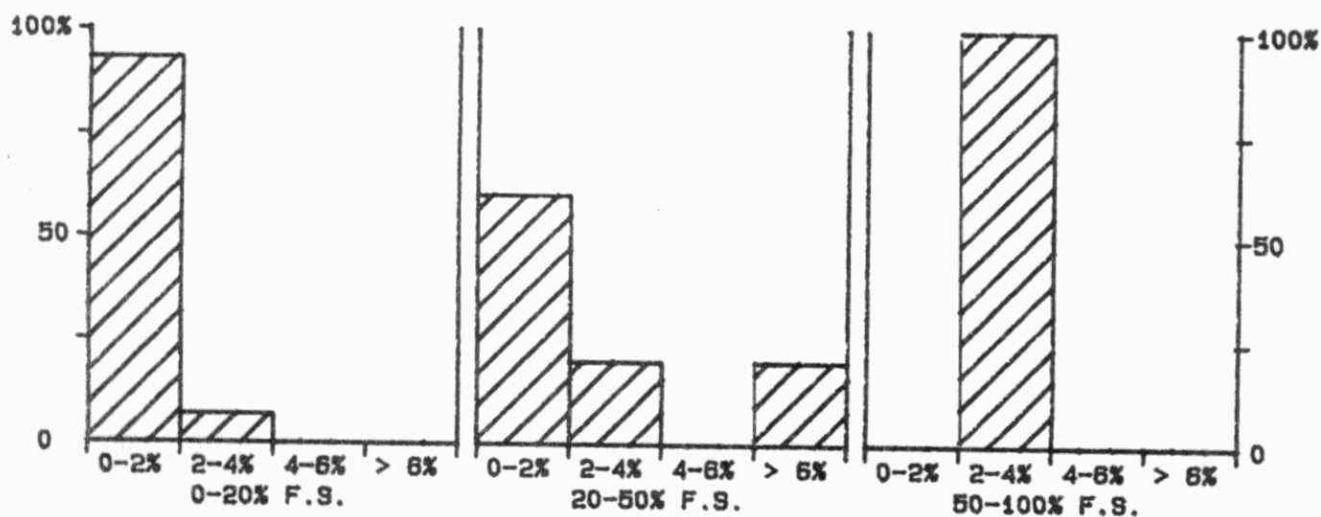
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	91	0.3	0.16

QUALITY CONTROL GRAPHS PHENOLICS - REACTIVE (UG/L AS PHENOL)

FROM: 03/01/86
 TO: 18/12/88



--- EXPECTED VALUE
 — CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): 50 UG/L AS PHENOL

*** PHOSPHORUS - REACTIVE ORTHOPHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/79
LIS Test Code Name:	PP04FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Sample Type/Matrix:	Rivers, Lakes, Precipitation, Soil Extracts, Effluents.		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance : 0.2 at the full scale level.

N.B. Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.0005 T value: 0.002

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/02/84 -Sample filtration was eliminated for all sample classes but Great Lakes (G). Reduction period was reduced from 4 to 2 min. to lessen danger of poly phosphate conversion to orthophosphate during analysis.

15/05/84 -Commadore PET microcomputer system was introduced. At this time the number of calibration standards was increased from 3 to 7, and the calibration technique was changed from linear interpolation to the use of a quadratic.

01/10/84 -Sample filtration was eliminated for Great Lakes (G) samples.

12/02/86 -HP9920 microcomputer introduced to replace Commadore PET.

PHOSPHORUS - REACTIVE ORTHOPHOSPHATE
QUALITY CONTROL DATA FROM 01/03/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 0.002 to 0.1250 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	145	0.1000	0.1004	0.0004	0.00198
b :	145	0.0250	0.0257	0.0007	0.00167
a+b :	145	0.1250	0.1261	0.0011	0.00292
a-b :	145	0.0750	0.0747	-0.0003	0.00222
c :	146	0.0250	0.0257	0.0007	0.00167
d :	146	0.0125	0.0127	0.0002	0.00101
c+d :	146	0.0375	0.0384	0.0009	0.00256
c-d :	146	0.0125	0.0131	0.0006	0.00104

s.d.(AB): Sw(within run): 0.00157 S(between runs): 0.00183 S/Sw: 1.17
s.d.(CD): Sw(within run): 0.00074 S(between runs): 0.00138 S/Sw: 1.88

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.1194 to 0.1306 for A+B
0.0712 to 0.0787 for A-B
0.0337 to 0.0412 for C+D
0.0100 to 0.0150 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	270	0.0000 - 0.0100	0.0007	22.7
	51	0.0100 - 0.0200	0.0013	9.2
	44	0.0200 - 0.0500	0.0012	3.9
	53	0.0500 - 0.1250	0.0023	2.4
	418	Overall	0.0012	N/A

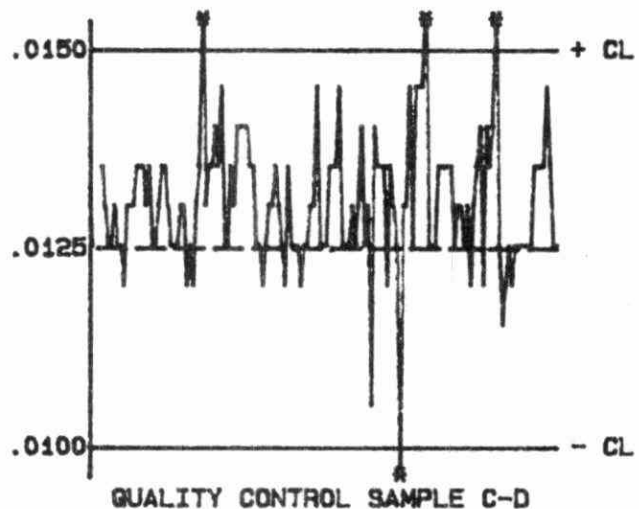
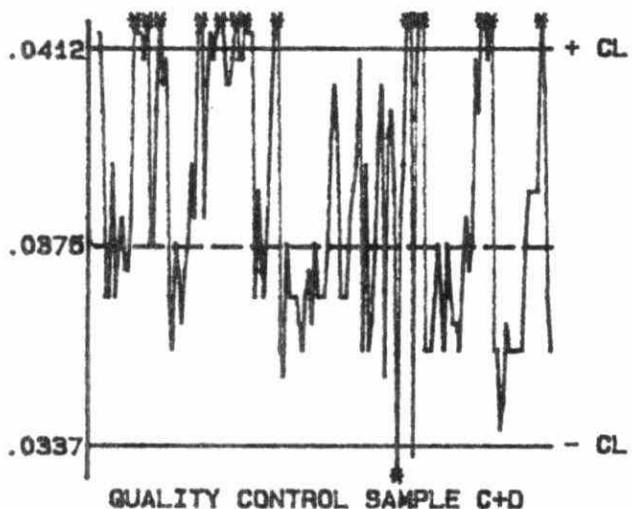
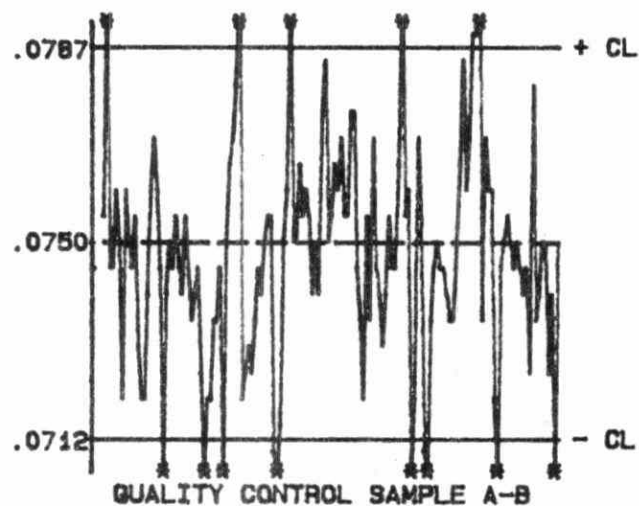
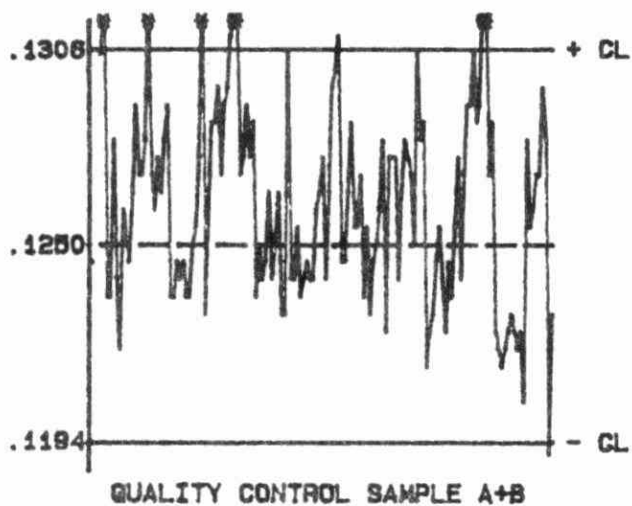
STANDARD DEVIATION (s.dup1): 0.0007 W value: 0.0005 T value: 0.002

OTHER CHECKS:

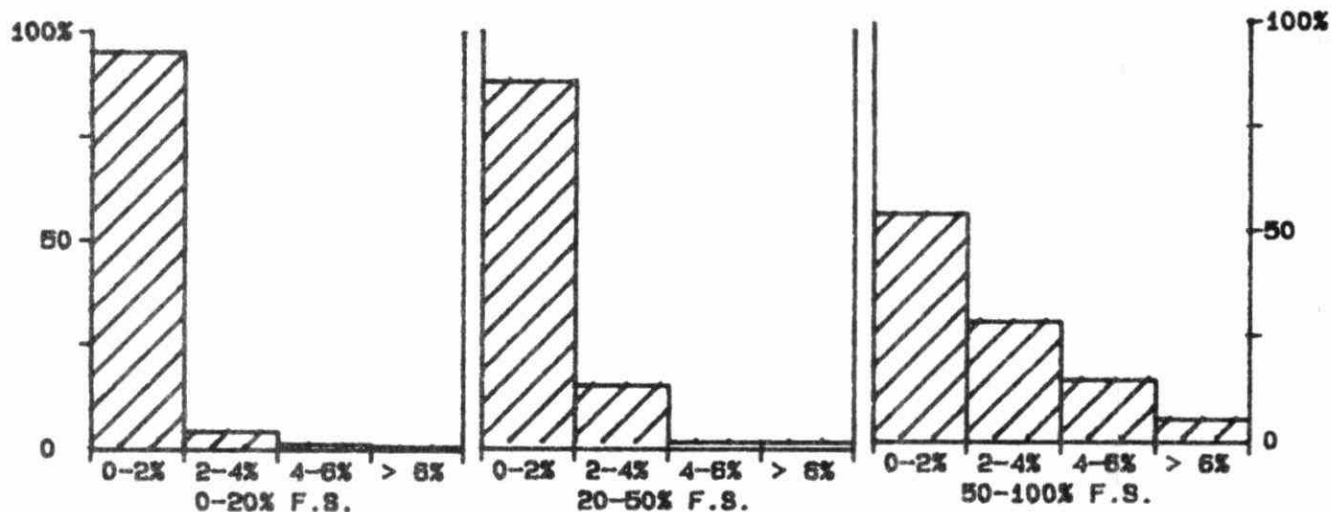
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	146	0.0006	0.00078

QUALITY CONTROL GRAPHS PHOSPHORUS - REACTIVE ORTHOPHOSPHATE (MG/L AS P)

FROM: 01/03/86
 TO: 23/12/86



— EXPECTED VALUE
 — CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
 FULL SCALE VALUE (F.S.): .125 MG/L AS P

*** PHOSPHORUS - REACTIVE ORTHOPHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/79
LIS Test Name Code:	PP04FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Sample Type/Matrix:	Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Orthophosphate is determined on the supernatant of a settled sample by the formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.5 at the full scale level

N.B. Ammonia plus ammonium, nitrite and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA

Drift : BL every 10 samples; BL plus standard every 20 sample

MODIFICATIONS:

02/07/85 -Sample filtration for all sample classes was eliminated.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2. One analytical range is now used.

PHOSPHORUS - REACTIVE ORTHOPHOSPHATE
QUALITY CONTROL DATA FROM 10/01/86 TO 16/12/86

Lab: Colourimetry

Analytical Range: 0.1 to 10.00 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	142	7.00	7.00	0.00	0.102
b :	142	3.50	3.51	0.01	0.061
a+b :	142	10.50	10.51	0.01	0.140
a-b :	142	3.50	3.50	-0.00	0.092
c :	142	3.50	3.52	0.02	0.064
d :	142	0.70	0.69	-0.01	0.043
c+d :	142	4.20	4.20	0.00	0.089
c-d :	142	2.80	2.83	0.03	0.062

s.d.(AB): Sw(within run): 0.065 S(between runs): 0.084 S/Sw: 1.29
s.d.(CD): Sw(within run): 0.044 S(between runs): 0.055 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.05 to 10.95 for A+B
3.20 to 3.80 for A-B
3.96 to 4.44 for C+D
2.64 to 2.96 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	207	0.00 - 0.40	0.041	39.5
	35	0.40 - 1.00	0.134	22.9
	23	1.00 - 2.00	0.122	8.7
	28	2.00 - 4.00	0.275	9.8
	12	4.00 - 10.00	0.084	1.6
	305	Overall	0.107	N/A

STANDARD DEVIATION (s.dupl): 0.041 W value: 0.02 T value: 0.1

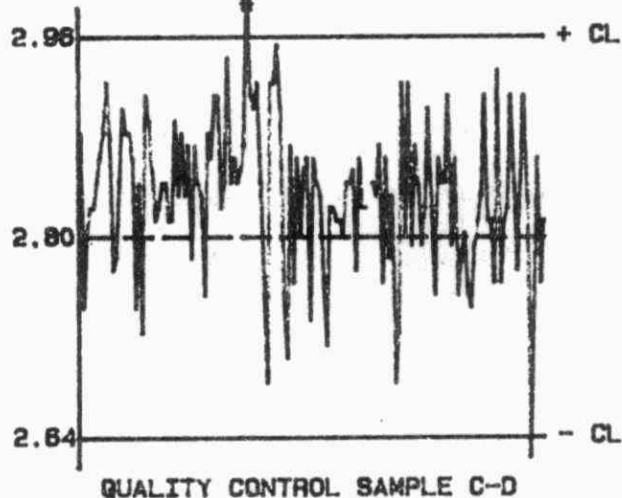
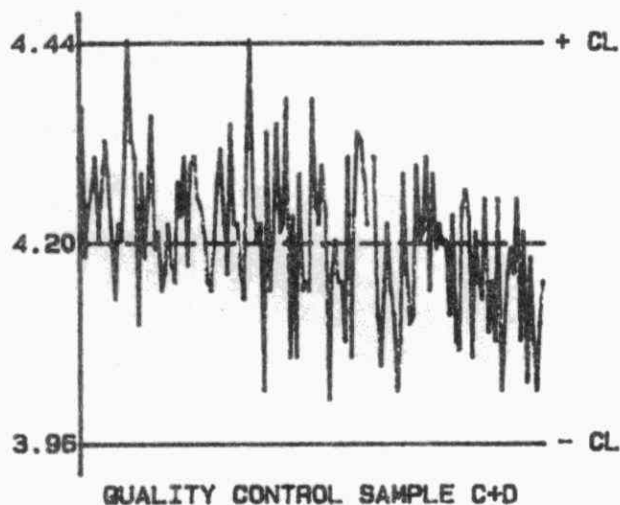
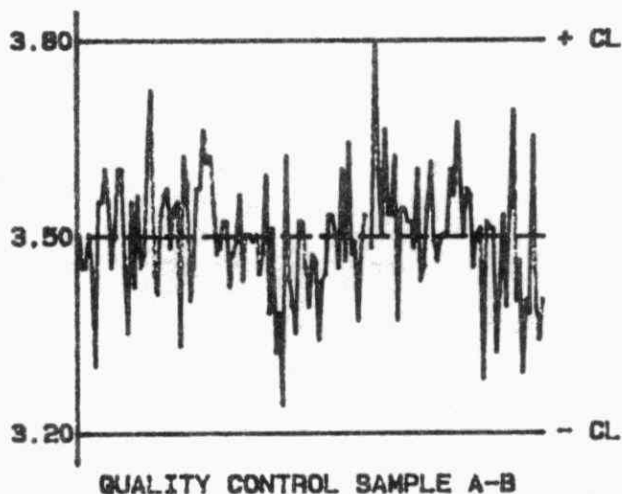
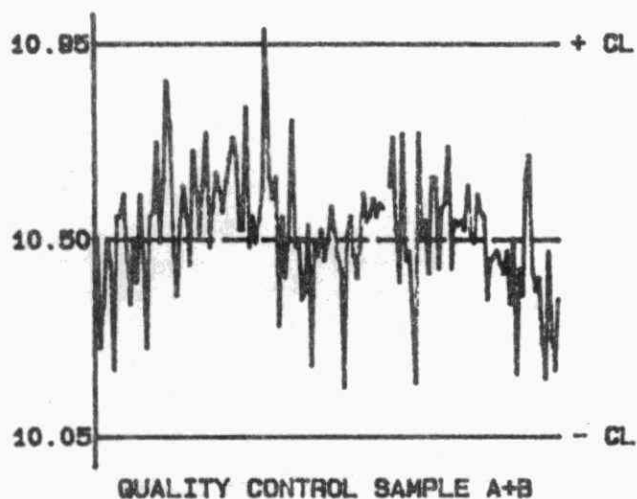
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal :	6	613	46.2
Long Term Blank :	129	0.09	0.527

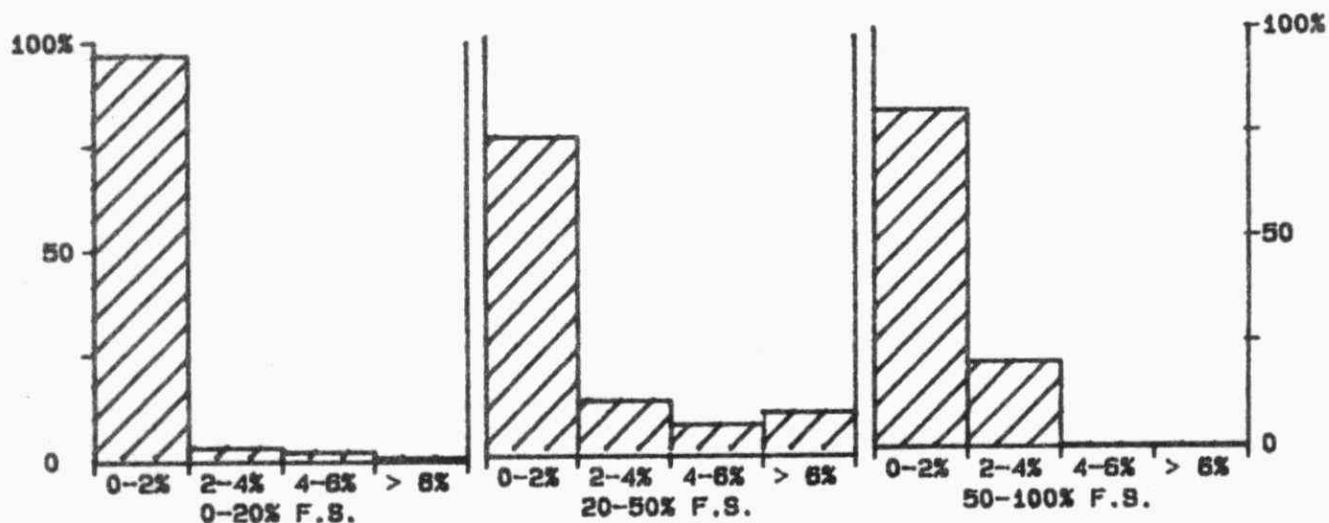
QUALITY CONTROL GRAPHS PHOSPHORUS - REACTIVE ORTHOPHOSPHATE (MG/L AS P)

FROM: 10/01/86

TO: 16/12/86



— EXPECTED VALUE
 — CONTROL LIMIT (CL)
 * DATA > 15% OUTSIDE CL



*** PHOSPHORUS-TOTAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/04/79
LIS Test Name Code:	PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents.			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic (polystyrene)

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200 C and 360 C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.4 at the full scale level.

N.B. Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

- Block digesters(2)
- Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
- Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 4 undigested standards

CONTROLS:

Calibration: LTBL plus 2 undigested standards, eg, QCA
Recovery : 3 digested BL plus 3 digested standards in duplicate, eg, R1
Drift : BL every 10 samples; BL plus undigested standard every 20 samples

MODIFICATIONS:

15/08/83 -Commadore PET microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to the use of a quadratic.

26/02/86 -HP9820 microcomputer replaced Commadore PET.

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

PHOSPHORUS-TOTAL
QUALITY CONTROL DATA FROM 26/02/86 TO 23/12/86

Lab: Colourimetry

Analytical Range: 0.01 to 0.200 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	157	0.150	0.148	-0.002	0.0017
b :	157	0.050	0.049	-0.001	0.0019
a+b :	157	0.200	0.197	-0.003	0.0030
a-b :	157	0.100	0.099	-0.001	0.0020

s.d.(AB): Sw(within run): 0.0014 S(between runs): 0.0018 S/Sw: 1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.191 to 0.203 for A+B
0.094 to 0.106 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	157	0.140	0.134	0.0051
r2 :	157	0.084	0.080	0.0048
r3 :	157	0.028	0.027	0.0036

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
324	0.000 - 0.020	0.0021	24.4
112	0.020 - 0.050	0.0072	23.7
30	0.050 - 0.100	0.0039	6.0
12	0.100 - 0.200	0.0045	2.7
478	Overall	0.0041	N/A

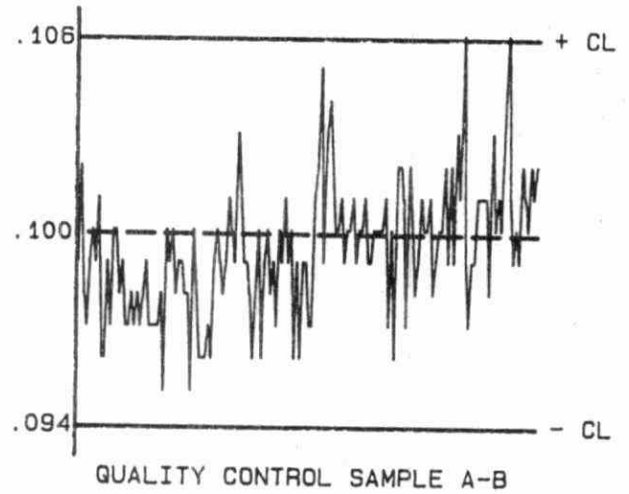
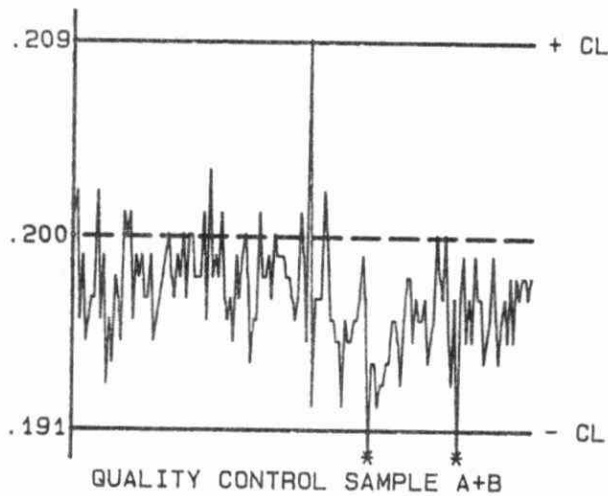
STANDARD DEVIATION (s.dupl): 0.0021 W value: 0.002 T value: 0.01

OTHER CHECKS:

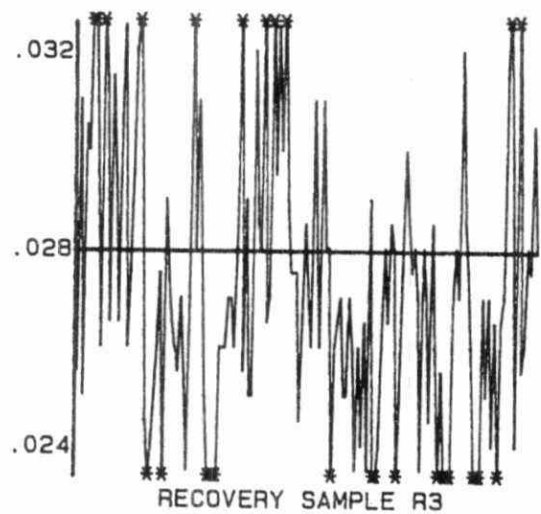
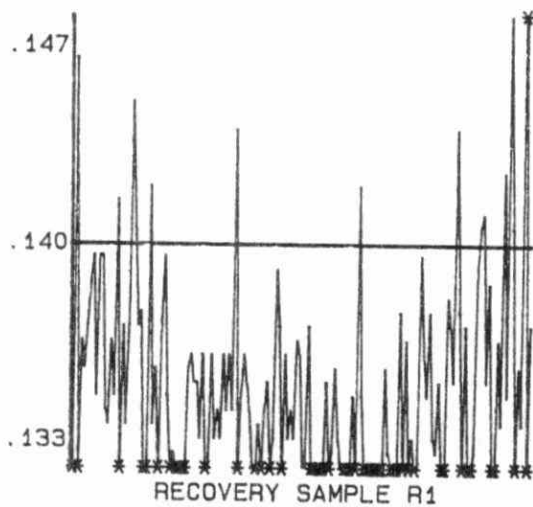
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	157	-0.001	0.0016
Digested Blank :	157	0.003	0.0026

QUALITY CONTROL GRAPHS PHOSPHORUS-TOTAL (MG/L AS P)

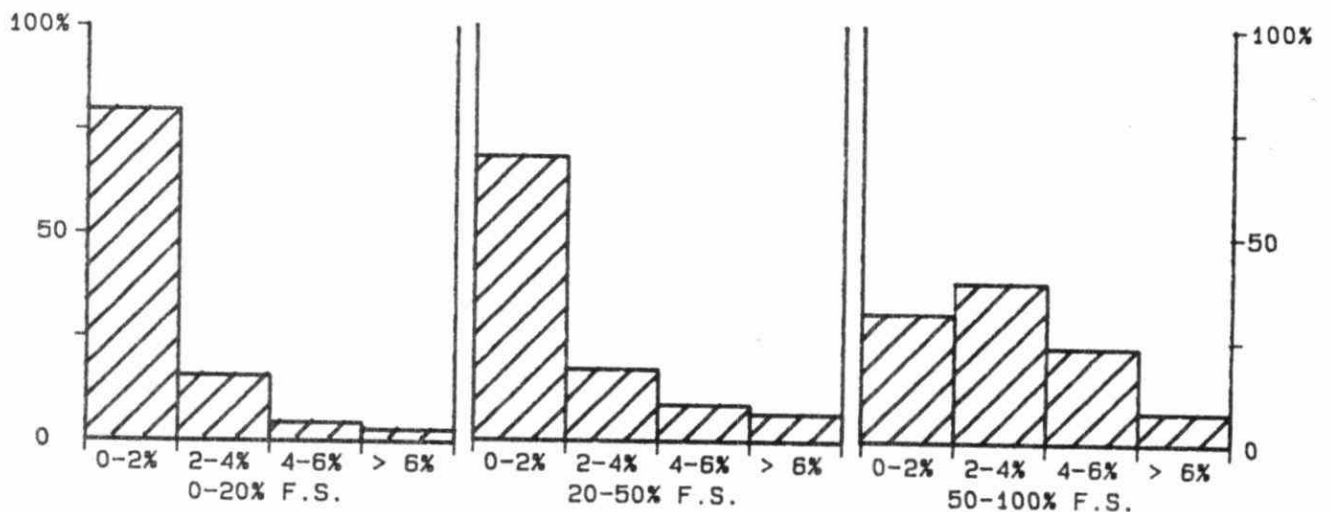
FROM: 26/02/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): .2 MG/L AS P

*** PHOSPHORUS - TOTAL ***

IDENTIFICATION:

Laboratory : Colourimetry Method Introduced: 01/04/78
LIS Test Name Code: PPUT Units : mg/L as P
Work Station Code : STKNP Unit Code : 064815
Method Code : 504BC2 Supervisor : M. Rawlings
Sample Type/Matrix: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using two block digesters kept at 200 C and 360 C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

N.B. Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

-Block digesters (2)
-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 6 undigested standards

CONTROLS:

Calibration : LTBL plus 3 undigested standards, eg, QCA
Recovery : 2 digested BL plus 3 digested standards in duplicate, eg, R1
Drift : BL every 10 samples; BL plus standard every 20 samples

MODIFICATIONS:

01/10/85 -Higher range selected, full scale changed from 2 to 5 mg/L as P. New calibration controls added. Calibration control results collected before high range was implemented are included in plot.

18/06/86 -HP9920 microcomputer system was introduced. At this time the calibration technique was changed from linear interpolation to quadratic using 6 standards instead of 2.

NOTES:

System is calibrated with undigested standards.

**Minimum dilution is 50% (i.e. factor of two). Therefore, minimum increment and detection criterion are actually twice that listed.

PHOSPHORUS - TOTAL
QUALITY CONTROL DATA FROM 03/01/86 TO 16/12/86

Lab: Colourimetry

Analytical Range: 0.1 to 5.00 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	177	3.50	3.48	-0.02	0.041
b :	177	1.40	1.38	-0.01	0.018
a+b :	177	4.90	4.86	-0.04	0.055
a-b :	177	2.10	2.09	-0.01	0.033
c :	177	1.400	1.388	-0.012	0.0192
d :	171	0.280	0.272	-0.008	0.0152
c+d :	171	1.680	1.659	-0.021	0.0298
c-d :	171	1.120	1.115	-0.005	0.0181

s.d.(AB): SW(within run): 0.023 S(between runs): 0.032 S/Sw: 1.37
s.d.(CD): SW(within run): 0.0128 S(between runs): 0.0173 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.60 to 5.20 for A+B
1.90 to 2.30 for A-B
1.560 to 1.800 for C+D
1.040 to 1.200 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard (1) Deviation
r1 :	171	3.50	3.47	0.078
r2 :	170	1.40	1.38	0.043
r3 :	169	0.700	0.666	0.0256

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean (2) s.d.	Coefficient of var.(%)
174	0.000 - 0.200	0.0327	58.4
54	0.200 - 0.400	0.0278	9.7
113	0.40 - 1.00	0.074	11.3
78	1.00 - 2.00	0.071	4.8
48	2.00 - 5.00	0.078	2.7
467	Overall	0.057	N/A

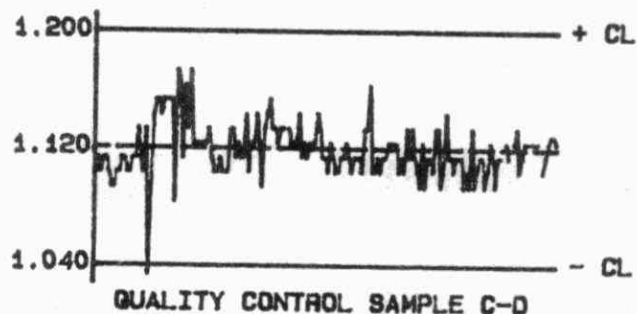
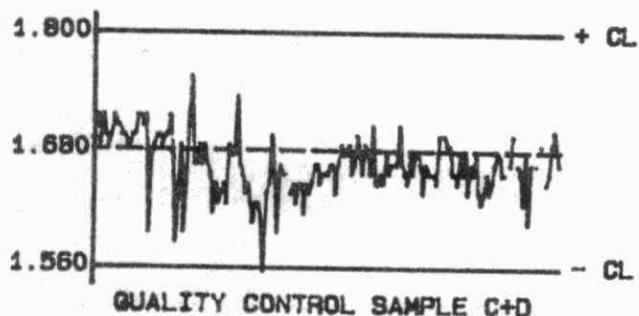
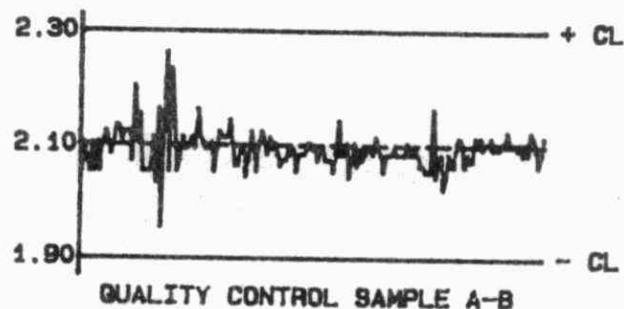
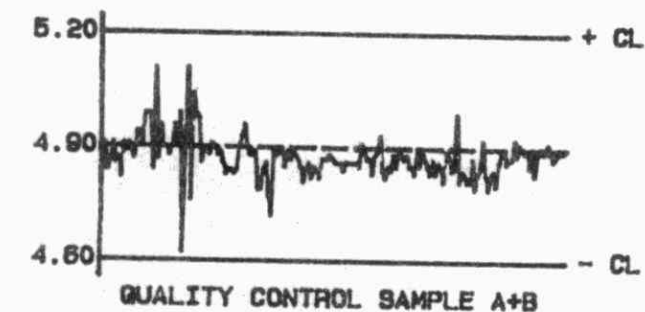
STANDARD DEVIATION (s.dup1): 0.0327 W value: 0.02 T value: 0.1

OTHER CHECKS:

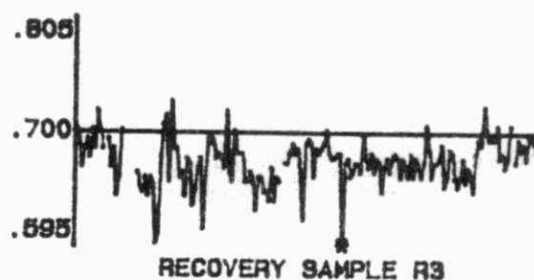
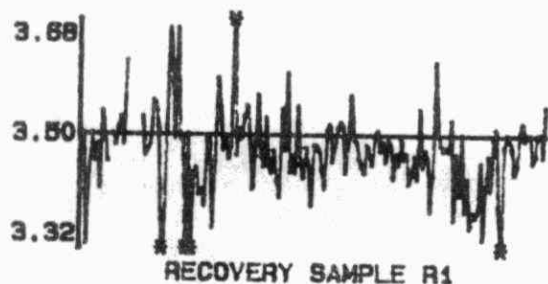
	Number of Data	Data Mean	Standard (1) Deviation
Std. Cal :	23	475	15.7
Long Term Blank :	169	0.011	0.0119
Digested Blank :	155	0.016	0.0803

QUALITY CONTROL GRAPHS PHOSPHORUS - TOTAL (MG/L AS P)

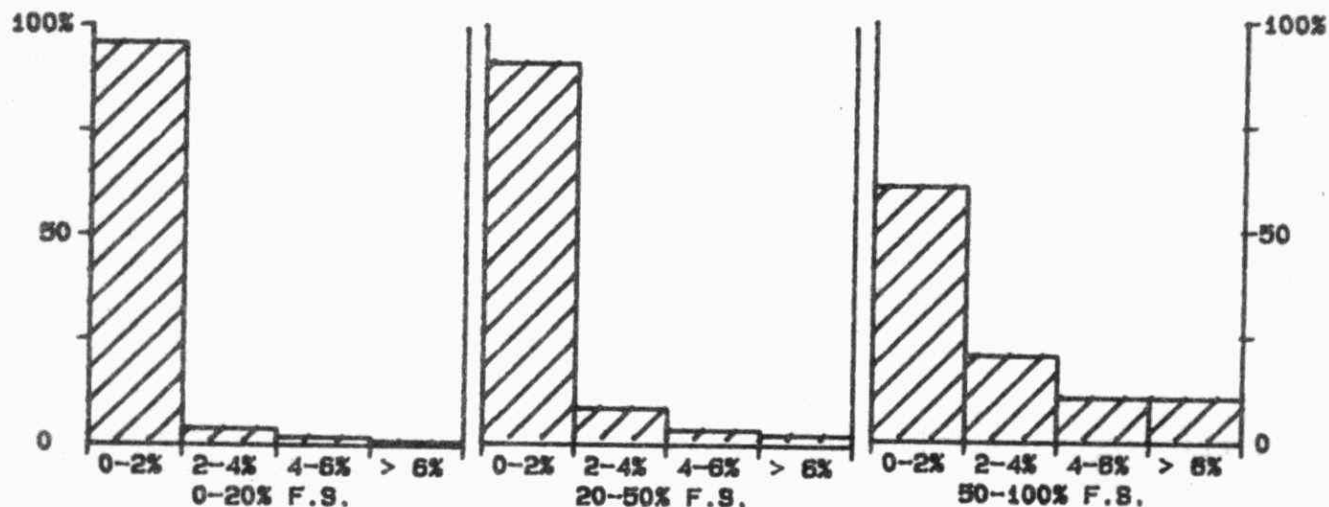
FROM: 03/01/88
TO: 18/12/88



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** PHOSPHORUS - TOTAL ***

Laboratory	: Dorset	Method Introduced:	22/03/79
LIS Test Name Code:	PPUT1	Units	: ug/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5826C2	Supervisor	: F. Tomassini
Sample Type/Matrix:	Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required: 35 mL

Container : Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121 C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance : 0.3 at the full scale level.

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 undigested standards

CONTROLS:

Calibration : LTBL plus 4 undigested standards, eg, QCA

Recovery : 3 digested BL plus 4 digested standards, eg, R1

Drift : BL every 10 samples and BL plus 2 undigested standards every 20 samples.

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.

PHOSPHOROUS - TOTAL
QUALITY CONTROL DATA FROM 07/01/86 TO 31/12/86

Lab: Dorset

Analytical Range: 1 to 200 ug/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	140	171	168	-3	2.8
b :	140	57	57	0	1.7
a+b :	140	228	225	-3	3.8
a-b :	140	114	112	-2	2.6
c :	140	17.1	16.9	-0.2	0.35
d :	140	5.7	5.7	0.0	0.14
c+d :	140	22.8	22.5	-0.3	0.45
c-d :	140	11.4	11.2	-0.2	0.28

s.d.(AB): Sw(within run): 1.8 S(between runs): 2.3 S/Sw: 1.26
s.d.(CD): Sw(within run): 0.20 S(between runs): 0.27 S/Sw: 1.35

On any given day the calibration is accepted if the values obtained lie within the ranges:

219 to 237 for A+B
108 to 120 for A-B
19.8 to 25.8 for C+D
9.4 to 13.4 for C-D

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	140	140	141	3.0
r2 :	140	70	71	2.1
r3 :	140	14.0	14.1	0.44
r4 :	139	7.0	7.2	0.36

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
93	0.0 - 5.0	0.41	13.8
132	5.0 - 10.0	0.68	9.0
110	10.0 - 20.0	0.95	6.8
58	20 - 50	2.0	6.8
22	50 - 200	5.1	5.1
415	Overall	1.5	N/A

STANDARD DEVIATION (s.dup1): 0.41

W value: 0.2

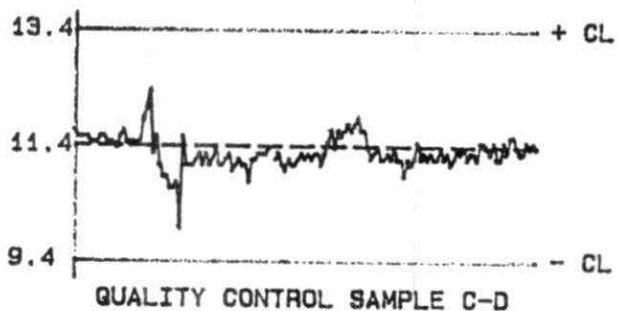
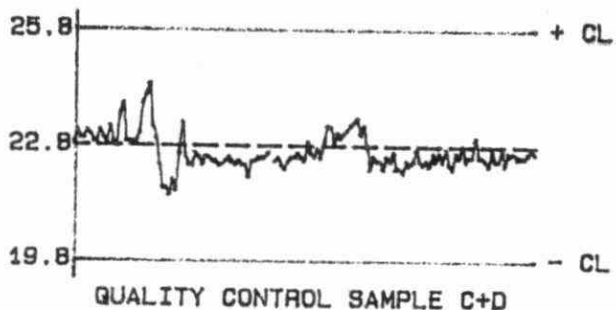
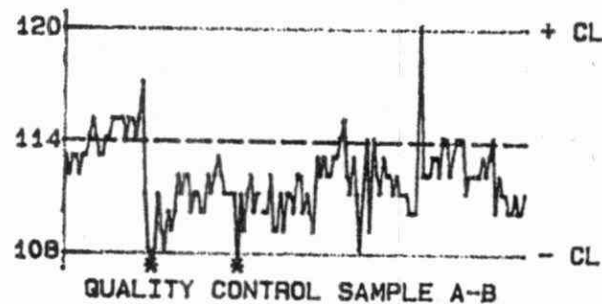
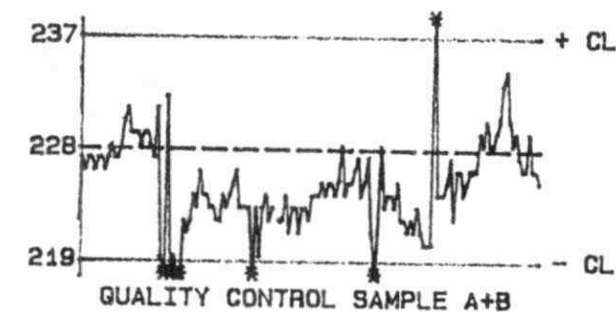
T value: 1

OTHER CHECKS:

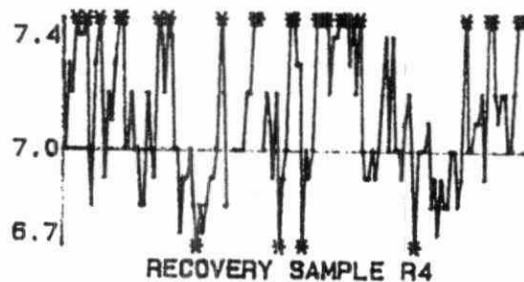
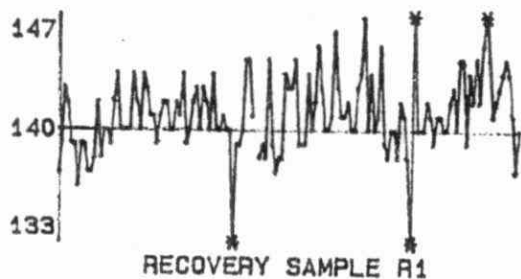
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal. :	140	558	82.4
Long Term Blank :	140	0.1	0.14
Digested Blank :	140	0.9	0.32

QUALITY CONTROL GRAPHS PHOSPHOROUS - TOTAL (UG/L AS P)

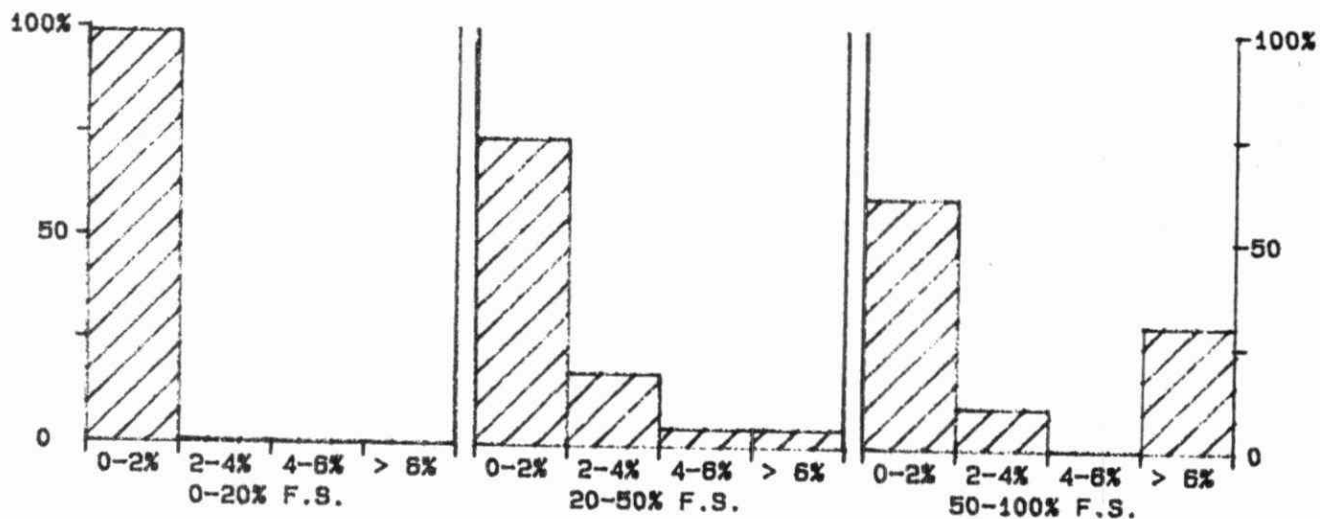
FROM: 07/01/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 UG/L AS P

*** POTASSIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 18/05/79
LIS Test Name Code: KKUR Units : mg/L as K
Work Station Code : PRAA Unit Code : 064819
Method Code : 002EA1 Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow

SAMPLING:

Quantity Required: 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Samples are analysed by AAS at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, GCA
Drift : BL every 10 samples; 2 standards every 20 samples.

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET for data capture and data reduction. Sample required reduced to 5 mL.

POTASSIUM
 QUALITY CONTROL DATA FROM 06/01/86 TO 22/12/86

Lab: Atomic Absorption

Analytical Range: 0.05 to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	71	0.600	0.602	0.002	0.0082
b :	70	0.100	0.105	0.005	0.0081
a+b :	70	0.700	0.707	0.007	0.0130
a-b :	70	0.500	0.497	-0.003	0.0101

s.d.(AB): Sw(within run): 0.0071 S(between runs): 0.0082 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

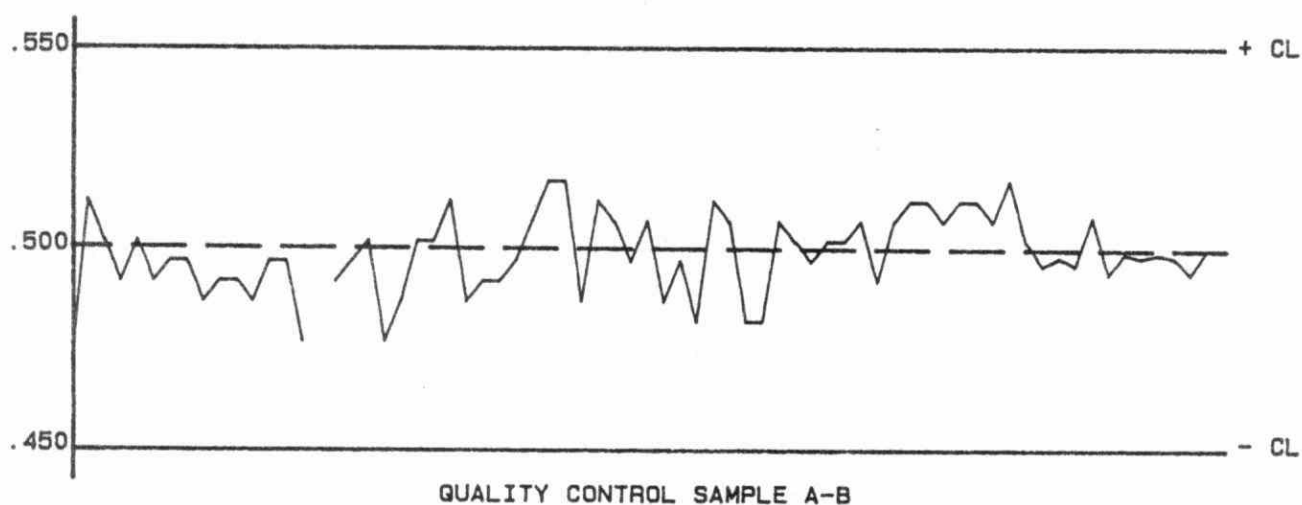
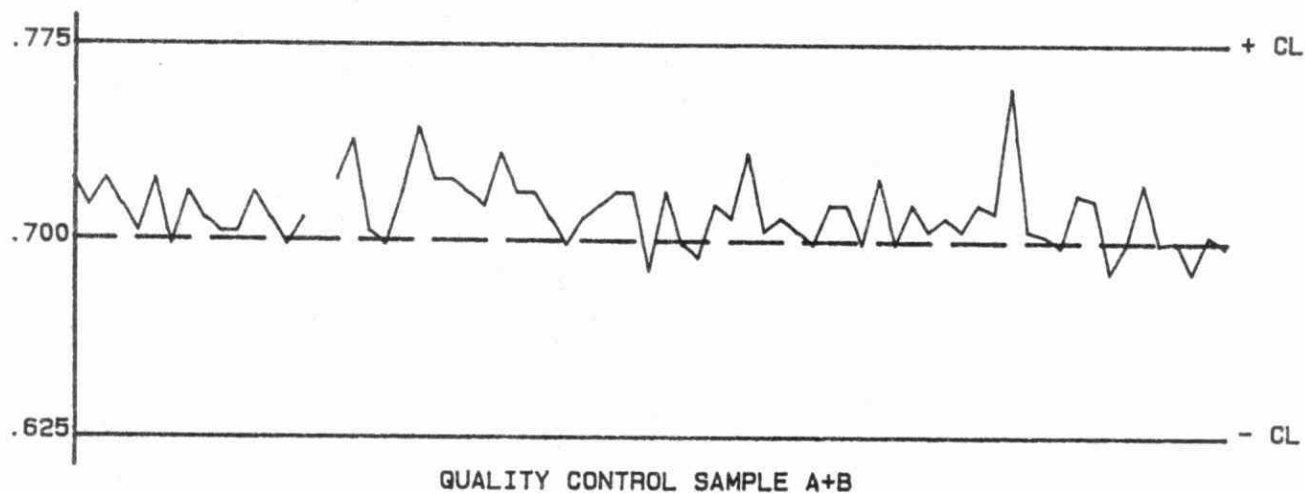
0.625 to 0.775 for A+B
 0.450 to 0.550 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	127	0.000 - 0.100	0.0122	38.3
	15	0.100 - 0.200	0.0250	18.5
	18	0.20 - 1.00	0.016	4.0
	160	Overall	0.014	N/A

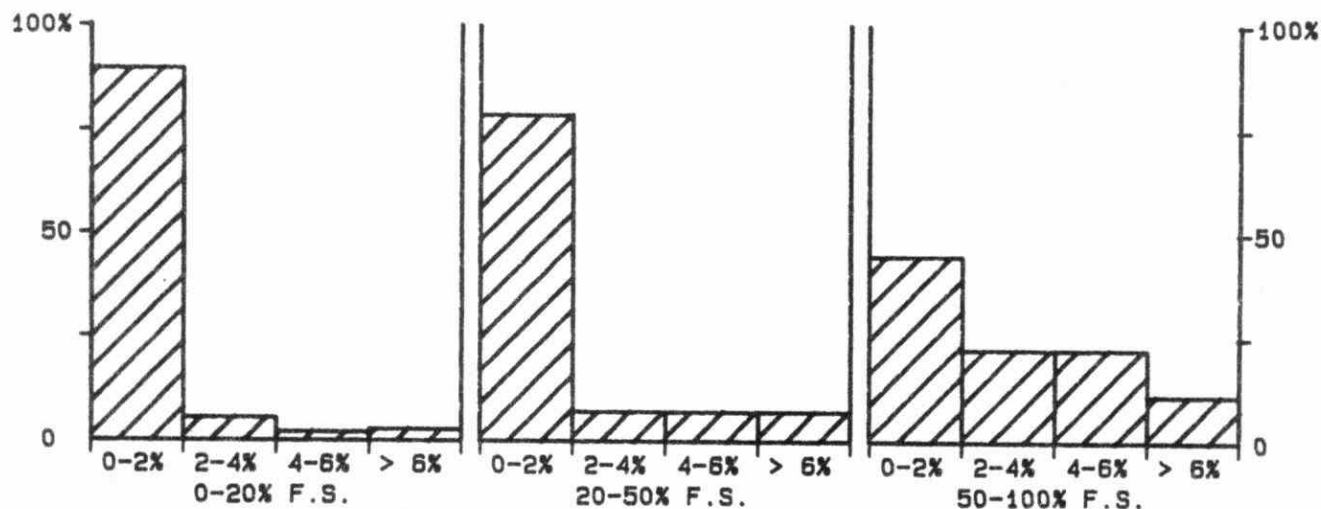
STANDARD DEVIATION (s.dup1): 0.0122 W value: 0.01 T value: 0.05

QUALITY CONTROL GRAPHS POTASSIUM (MG/L AS K)

FROM: 06/01/86
TO: 22/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS K

*** POTASSIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 01/04/74
LIS Test Name Code: KKUR Units : mg/L as K
Work Station Code : RMAAS Unit Code : 064819
Method Code : 0805A1 Supervisor : F. Tomassini
Sample Type/Matrix: Rivers, Lakes, Soil Extracts, Effluents.

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.10 at the full scale value

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 5.00 mg/L full scale; second analytical range was dropped.

01/03/84 -Analytical range (RMNAKH) was added; full scale: 1.00 mg/L. This range is currently restricted to special programs.

01/09/84 -Analytical range (RMNAKH) was increased from 5.00 to 10.0 mg/L full scale. Calibration technique was changed from quadratic to linear interpolation. Sodium is no longer determined simultaneously.

25/09/85 -Calibration range stayed at 10.0 mg/L but second analytical range was dropped. Concentration of QC solutions were adjusted accordingly. Commodore PET microcomputer controlled system with sample flow injection introduced.

1985 -Three analytical ranges were used during 1985: 1.00, 10.0, and 10.0 mg/L as K full scale.

POTASSIUM
QUALITY CONTROL DATA FROM 07/01/86 TO 30/12/86

Lab: Atomic Absorbtion

Analytical Range: 0.1 to 10.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	135	8.00	8.04	0.04	0.095
b :	135	0.70	0.70	-0.00	0.026
a+b :	134	8.70	8.74	0.04	0.096
a-b :	134	7.30	7.35	0.05	0.100

s.d.(AB): SW(within run): 0.071 S(between runs): 0.070 S/SW: 0.98

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.25 to 8.15 for A+B
7.00 to 7.60 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
177	0.00 - 0.50	0.020	7.4
85	0.50 - 1.00	0.028	3.8
57	1.00 - 2.00	0.037	2.6
36	2.00 - 5.00	0.087	2.8
2	5.00 - 10.00	0.070	0.9
357	Overall	0.037	N/A

STANDARD DEVIATION (s.dupl): 0.020

W value: 0.02

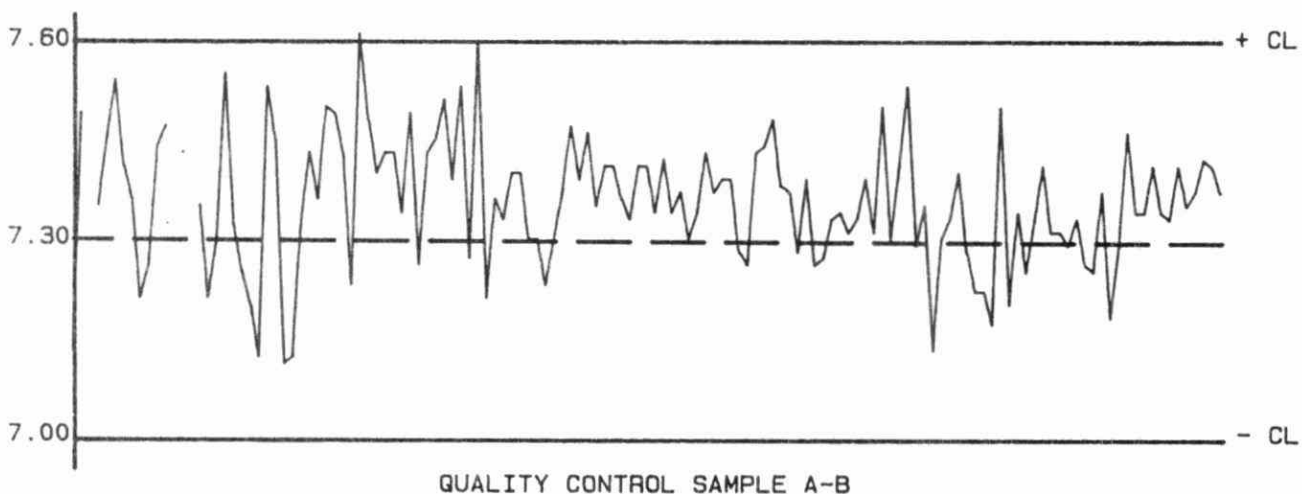
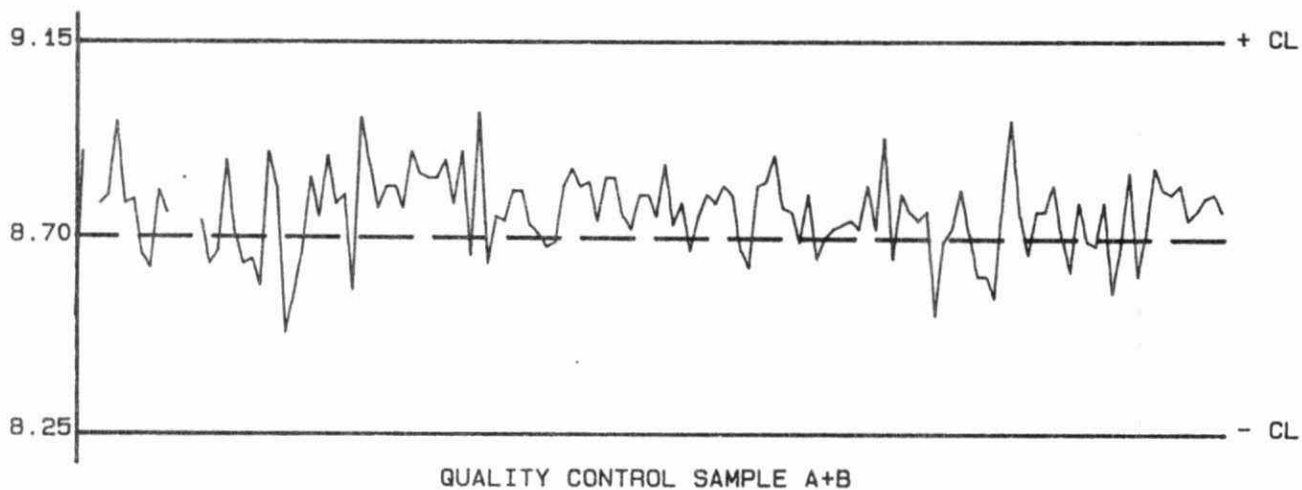
T value: 0.1

OTHER CHECKS:

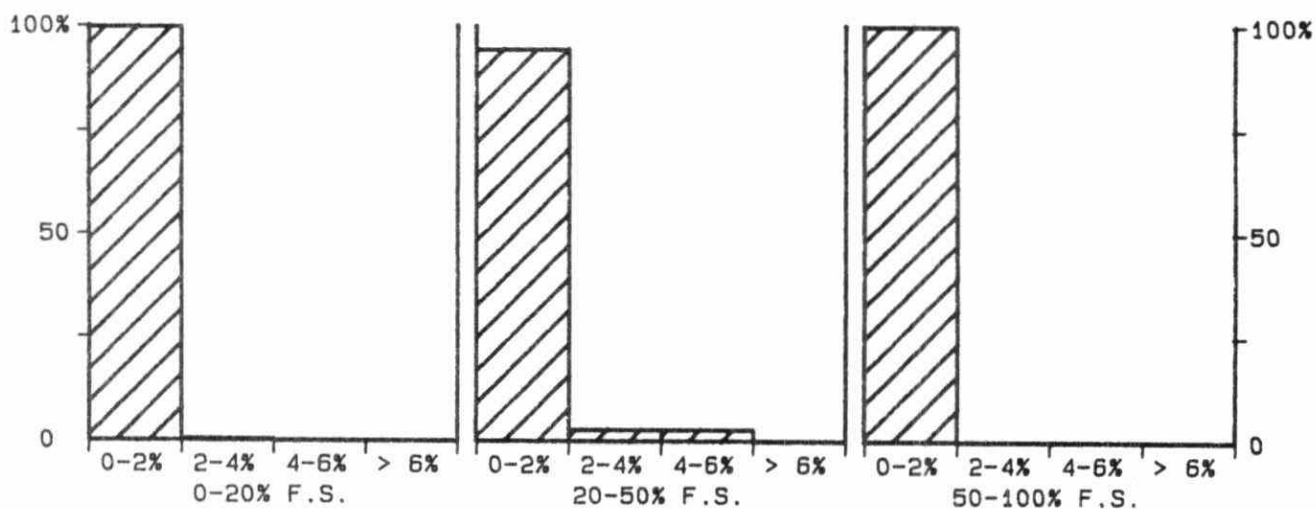
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	125	1.011	0.1352
Long Term Blank :	125	0.00	0.024

QUALITY CONTROL GRAPHS POTASSIUM (MG/L AS K)

FROM: 07/01/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS K

*** POTASSIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 08/04/86
LIS Test Name Code: KKUR Units : mg/L as K
Work Station Code : WAAS Unit Code : 064818
Method Code : 002EA1 Supervisor : F. Tommasini
Sample Type/Matrix: Domestic Waters, Leachates, Effluents

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.1 at full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 10 standards.

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL every 10 standards; 2 standards every 20 samples

MODIFICATION:

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 40 mg/L to 50 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solution adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

POTASSIUM
QUALITY CONTROL DATA FROM 08/04/86 TO 30/12/86

Lab: Atomic Absorption

Analytical Range: 0.5 to 50.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	64	40.0	39.9	-0.1	0.63
b :	64	3.50	3.49	-0.01	0.150
a+b :	64	43.50	43.44	-0.06	0.684
a-b :	64	36.50	36.45	-0.05	0.607

s.d.(AB): SW(within run): 0.43 S(between runs): 0.46 S/SW: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

41.25 to 45.75 for A+B
35.00 to 38.00 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	106	0.00 - 2.50	0.196	14.6
	28	2.50 - 5.00	0.304	8.7
	14	5.00 - 10.00	0.301	4.3
	3	10.0 - 20.0	0.23	1.8
	6	20.0 - 50.0	0.47	1.6
	157	Overall	0.24	N/A

STANDARD DEVIATION (s.dupl): 0.196

W value: 0.1

T value: 0.5

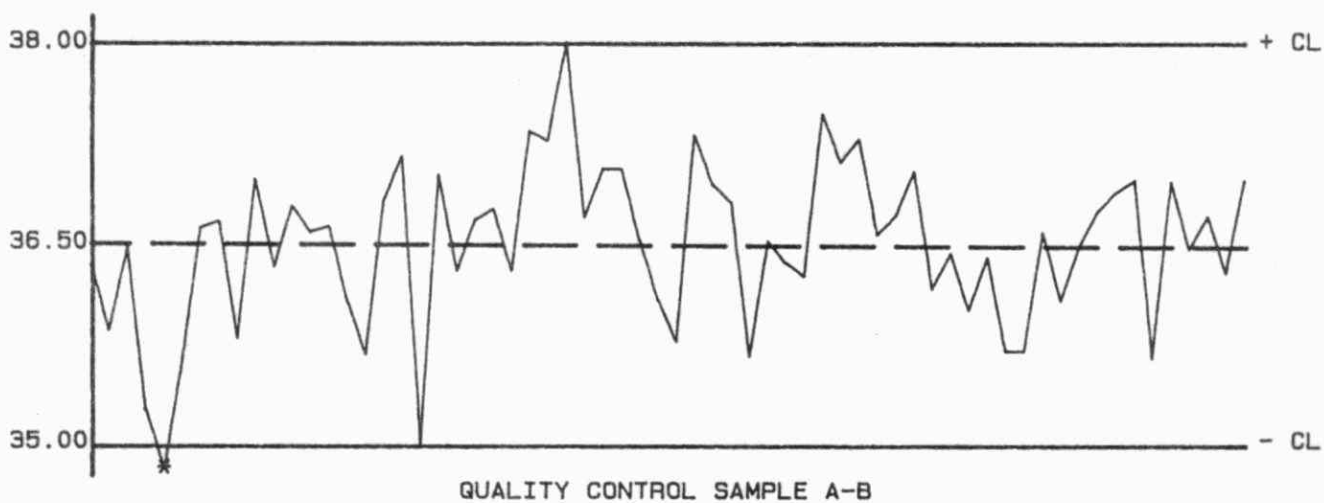
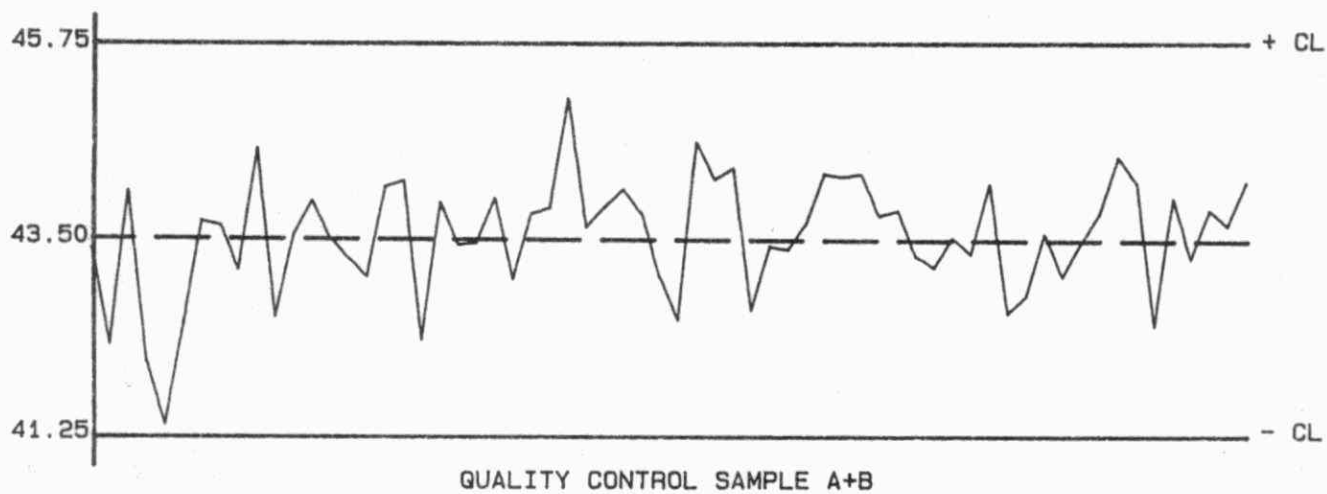
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	37	0.878	0.1471
Long Term Blank :	63	0.04	0.245

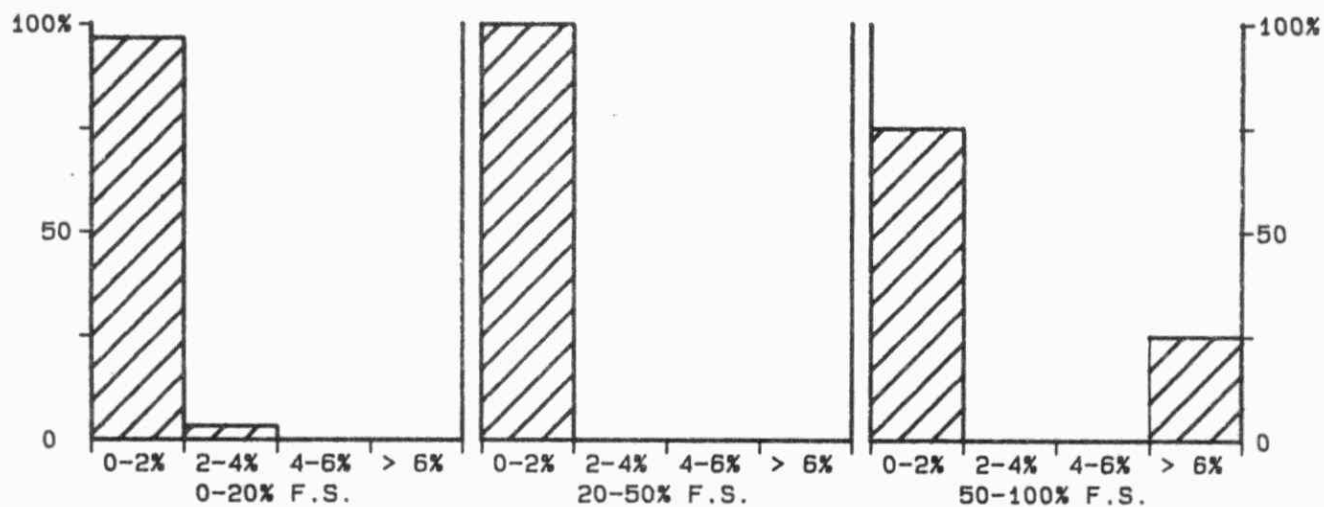
QUALITY CONTROL GRAPHS

POTASSIUM (MG/L AS K)

FROM: 08/04/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 50 MG/L AS K

*** POTASSIUM ***

IDENTIFICATION:

Laboratory : Domestic Water Method Introduced: Before '74
LIS Test Name Code: KKUR Units : mg/L as K
Work Station Code : WNAK Unit Code : 064819
Method Code : 002BA1 Supervisor : P. Campbell
Sample Type/Matrix: Domestic Waters, Leachates, Effluents

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.15 at the full scale level.

INSTRUMENTATION:

Automated modular continuous flow atomic absorption system (AAS). Two analytical ranges are obtained from the output of the AAS.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05* T value: 0.25

CALIBRATION:

BL plus 2 standards.

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 3 standards

MODIFICATIONS:

08/04/86 -THIS TEST WAS ASSIGNED TO THE WAAS WORKSTATION.

POTASSIUM
QUALITY CONTROL DATA FROM 03/01/86 TO 25/02/86

Lab: Domestic Water

Analytical Range: 0.25 to 40.0 mg/l as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	15	26.0	26.1	0.1	0.22
b :	15	6.5	6.4	-0.1	0.12
a+b :	15	32.5	32.5	0.0	0.25
a-b :	15	19.5	19.6	0.1	0.25
c :	15	6.50	6.37	-0.13	0.046
d :	15	1.30	1.31	0.01	0.034
c+d :	15	7.80	7.68	-0.12	0.056
c-d :	15	5.20	5.06	-0.14	0.057

s.d.(AB): Sw(within run): 0.18 S(between runs): 0.18 S/Sw: 1.00
s.d.(CD): Sw(within run): 0.040 S(between runs): 0.040 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

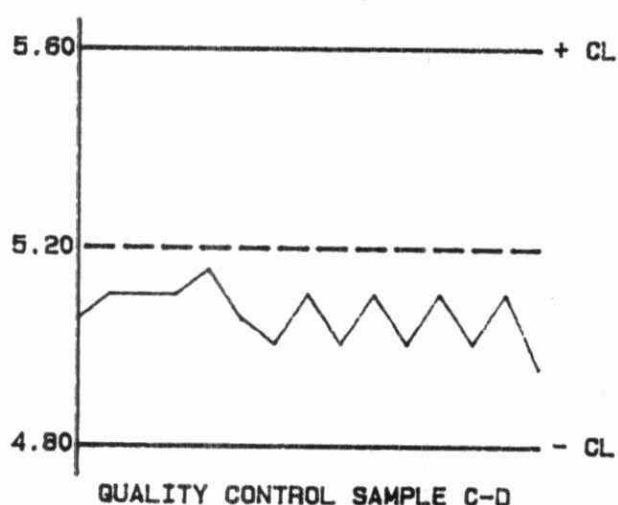
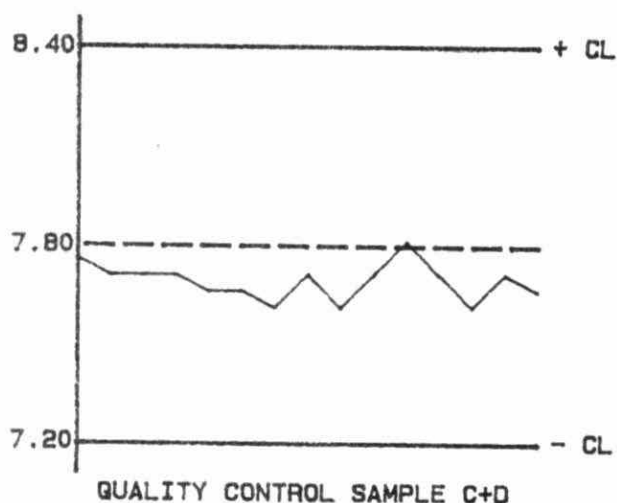
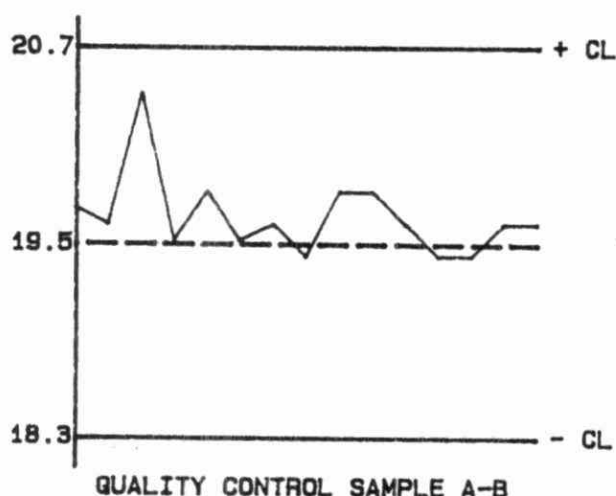
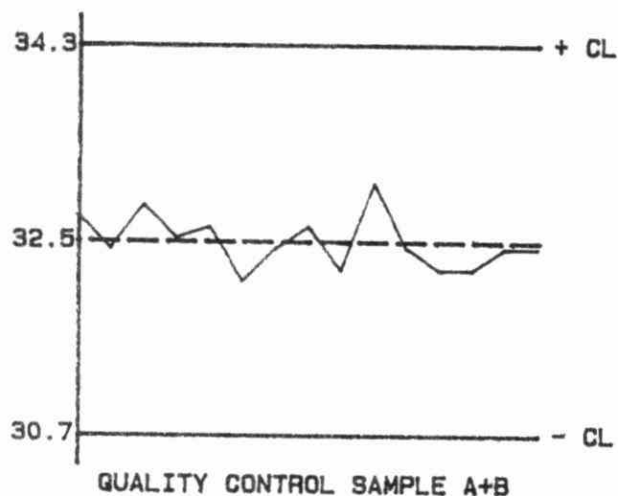
30.7 to 34.3 for A+B
18.3 to 20.7 for A-B
7.20 to 8.40 for C+D
4.80 to 5.60 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	6	0.00 - 1.00	0.020	2.8
	17	1.00 - 2.00	0.067	4.3
	12	2.00 - 5.00	0.060	2.1
	4	5.0 - 10.0	0.08	1.2
	2	10.0 - 40.0	0.05	0.3
	41	Overall	0.06	N/A

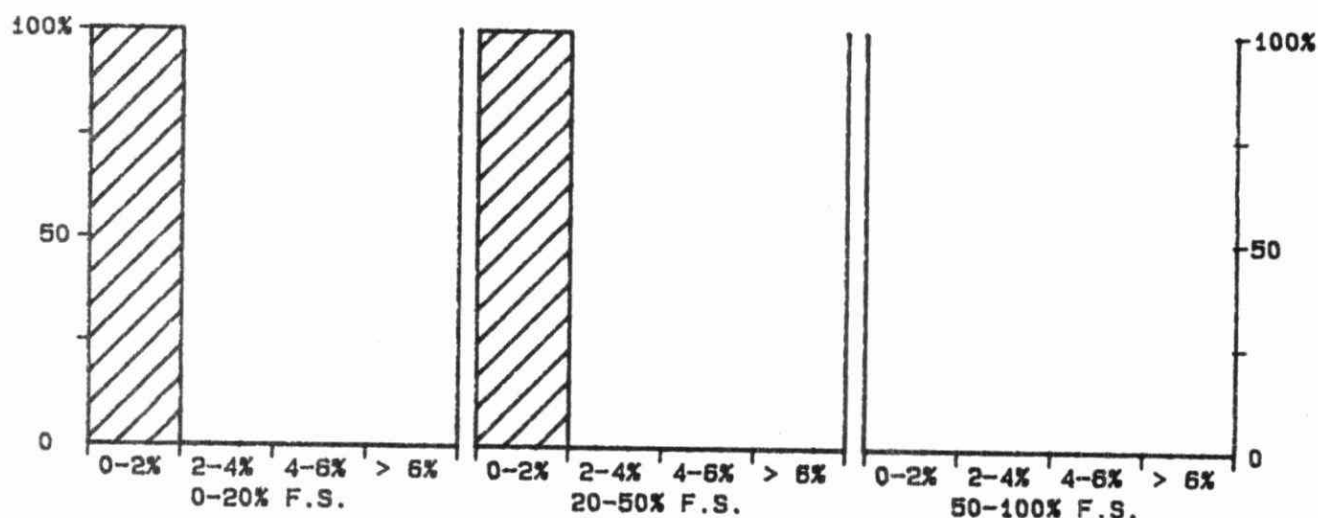
STANDARD DEVIATION (s.dupl): 0.067 W value: 0.05 T value: 0.25

QUALITY CONTROL GRAPHS POTASSIUM (MG/L AS K)

FROM: 03/01/86
TO: 25/02/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 40 MG/L AS K

*** POTASSIUM ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 18/05/79
LIS Test Name Code: KKUR Units : ug/filter as K
Work Station Code : PRLOV Unit Code : 361819
Method Code : 004BA3 Supervisor : F. Tomassini
Sample Type/Matrix: W40 filters from LoVal filter pack.

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bags

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analysed by AAS (workstation PRAA) at 766.5 nm with an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train. Results are converted to ug/filter as K.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples, 2 standards every 20 samples.

MODIFICATIONS:

July 81 -Addition of potassium analysis for W40 filters from LoVal filter packs was introduced.

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of a microcomputer to co-ordinate sampler, injection, AAS "read", and data reduction. Sample required reduced to 5 mL.

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

*** POTASSIUM - SOIL (Xsc) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	KKESC	Units	: meq/100g K
Work Station Code	: DOCAION	Unit Code	: 355000
Method Code	: 306AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 6 g (dry <2 mm).
Container : Glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

A 3 g quantity of sample plus 30 mL of 2N sodium chloride is agitated for 4 hours in a centrifuge tube. The sample is centrifuged and filtered. The filtrate is analyzed for K by AAS at 766.5 with an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. Aluminum, calcium, and magnesium are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 4 Calculated W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three soil samples representing different soil types; 2 method blanks; round robin CSSC samples
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/04/81 -3g sample used for all soil types (6g previously used for sandy soils)
01/06/86 -Varian 1275AAS replaced Perkin Elmer 403

NOTES:

Cation exchange capacity (CEC) is calculated as the sum of the sodium chloride exchangeable Al, Ca, Mg, and K.
Values for recoveries are unknown--average value used.

POTASSIUM - SOIL (Xsc)
QUALITY CONTROL DATA FROM 01/10/86 TO 30/12/86

Lab: Dorset Soils

Analytical Range: 0.05 to 0.75 meq/100g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	0.56	N/A	N/A	N/A
b :	0	0.18	N/A	N/A	N/A
a+b :	0	0.75	N/A	N/A	N/A
a-b :	0	0.38	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.68 to 0.81 for A+B
0.34 to 0.41 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	14	0.10	0.09	0.017
r2 :	14	0.47	0.47	0.032
r3 :	14	0.04	0.04	0.009

DUPLICATES:

	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
31		0.00 - 0.15	0.010	12.4
9		0.15 - 0.38	0.012	5.4
11		0.38 - 0.75	0.015	3.1
51		Overall	0.012	N/A

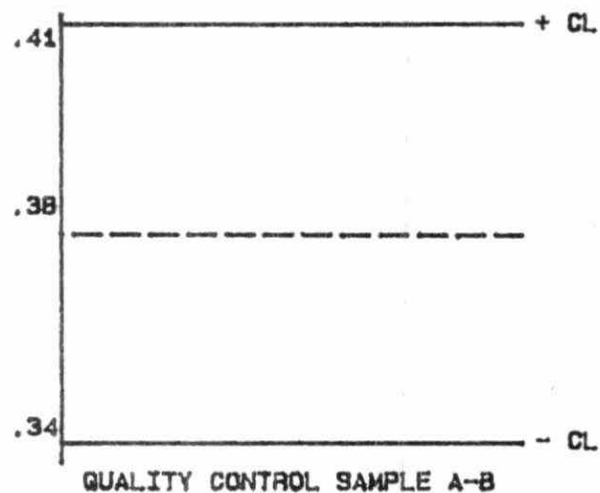
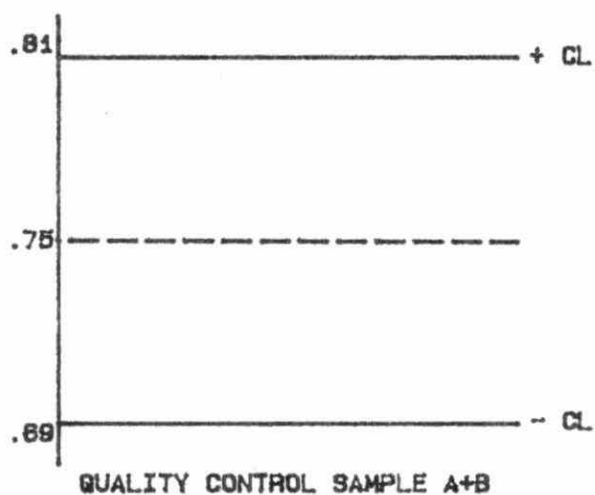
STANDARD DEVIATION (s.dup1): 0.010 W value: 0.01 T value: 0.05

OTHER CHECKS:

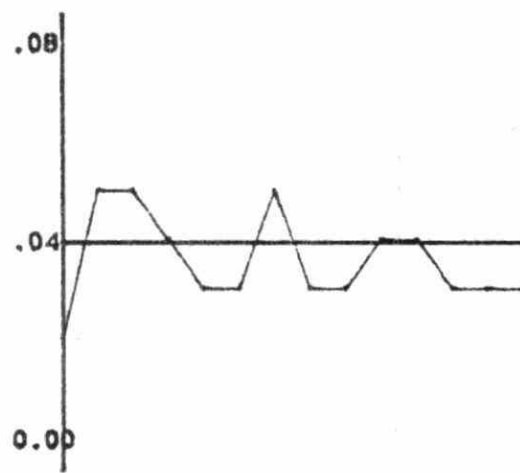
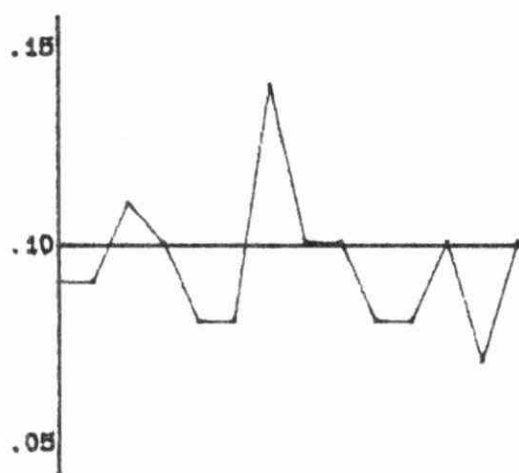
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	14	0.01	0.016

QUALITY CONTROL GRAPHS POTASSIUM - SOIL (XSC) (MEQ/100G)

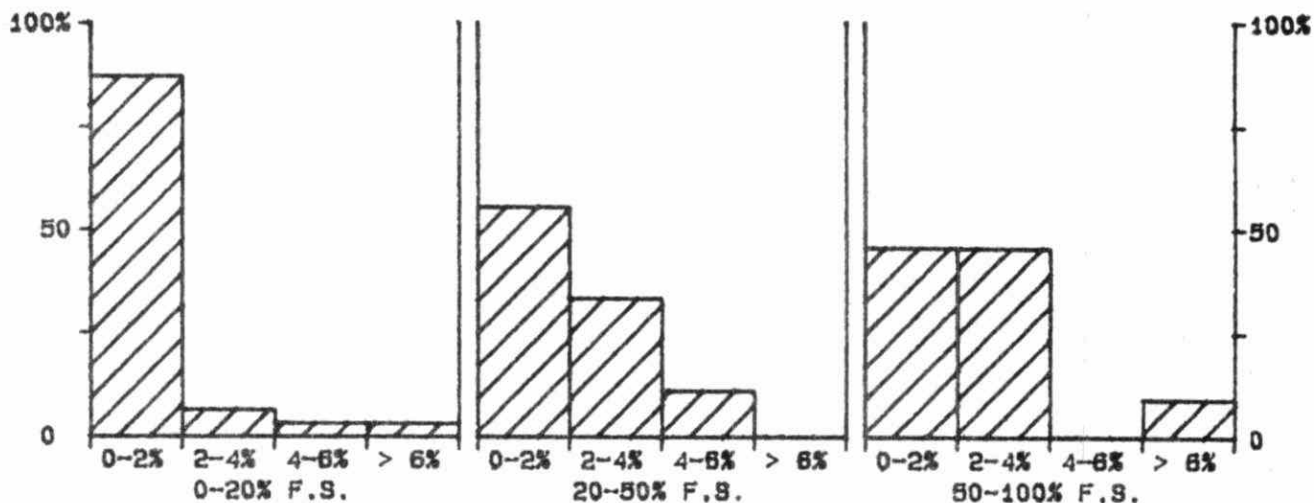
FROM: 01/10/86
TO: 30/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



*** SAND ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	SAND	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 20 g (dry <2 mm).
Container : glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (> 53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of sand in the sample is determined by weighing the dried sieved fraction and expressing that as a percentage by weight of the total (sand, silt and clay).

INSTRUMENTION:

Sartorius 4 place digital balance (model 1201)
Balance accurate to 0.0001 g.

REPORTING:

Maximum Significant Figures: 2 Calculated W value: N/A T value: N/A

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus
a round robin CSSC sample

NOTES:

Two recovery soils are alternated between batches, using their mean values.

SAND
QUALITY CONTROL DATA FROM 02/05/86 TO 20/06/86

Lab: Dorset Soils

Analytical Range: N/A to 100 % by wt.

RECOVERIES:	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
	-----	-----	-----	-----
r1 :	17	3.0	3.4	0.79
r2 :	12	56.0	55.4	2.15

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	4	0 - 20	1.1	18.1
	3	20 - 50	3.4	9.9
	20	50 - 100	0.9	1.4
	27	Overall	1.5	N/A

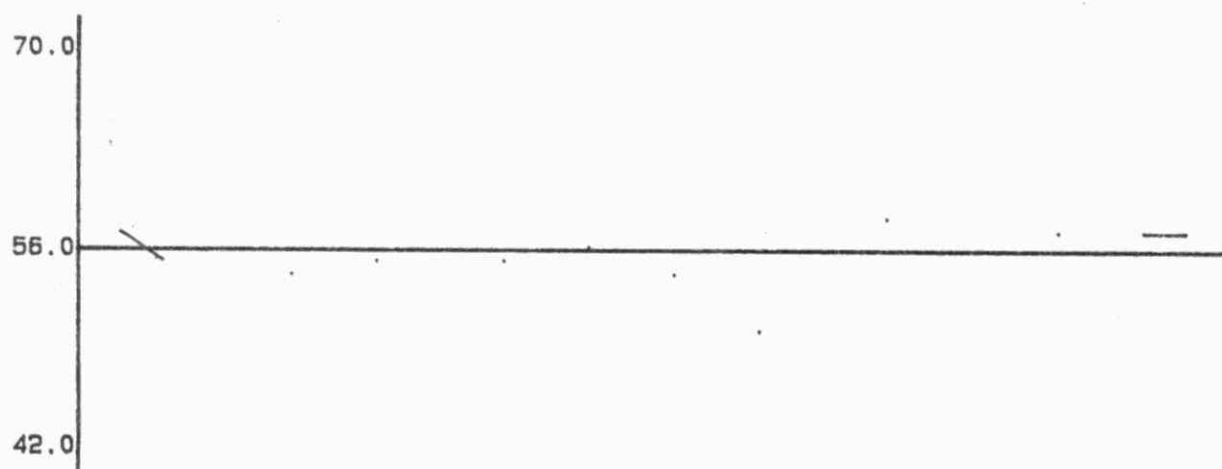
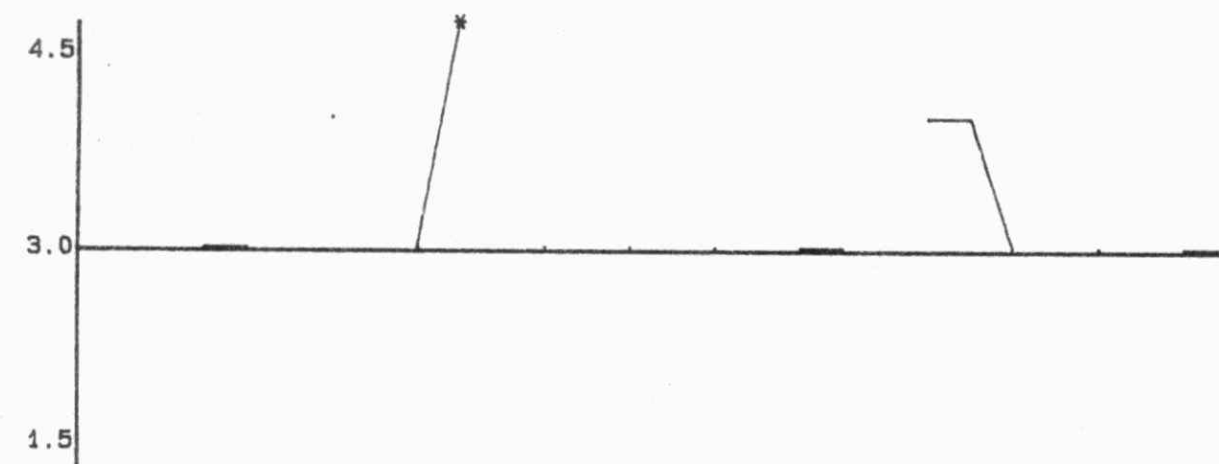
STANDARD DEVIATION (s.dupl): N/A

W value: N/A

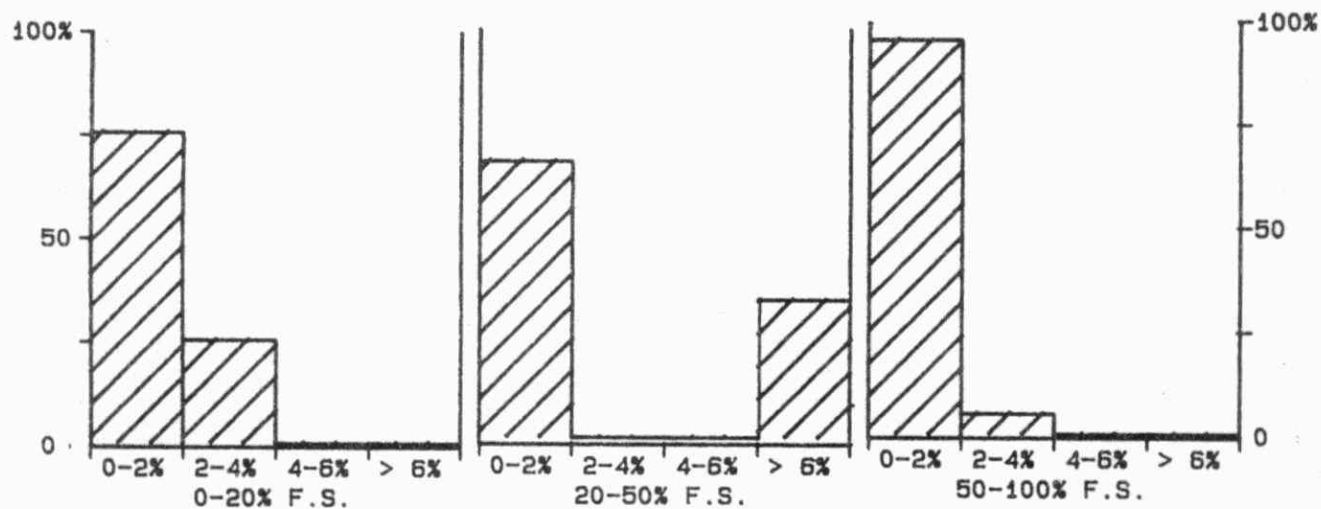
T value: N/A

QUALITY CONTROL GRAPHS SAND (% BY WT.)

FROM: 02/05/86
TO: 20/06/86



--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 % BY WT.

*** SILICON - REACTIVE SILICATES ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced:	01/02/75
LIS Test Name Code:	SI03UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates			

SAMPLING:

Quantity Required: 10 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference.

Approximate absorbance: 0.7 at the full scale level

N.B. Chloride, dissolved inorganic and organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm.

Data capture, reduction, and processing via a microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA

Drift : BL every 10 samples; standard every 20 samples

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10. The analytical rate was tripled. Concentrations of QC standards adjusted accordingly.

27/03/85 -Silicon analytical range was changed from 0-5.00mg/L to 0-10.00mg/L. First three months' data were omitted because they were not comparable with the later ones.

12/03/86 -Boxed-FIA system discontinued. Basic air-segmented continuous flow system implemented. Test transferred from RMSICL to ROM workstation. HP8920 microcomputer system introduced. Calibration technique changed from linear interpolation to quadratic. Number of calibration standards changed from 10 to 7.

NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$

SILICON
QUALITY CONTROL DATA FROM 04/03/86 TO 30/12/86

Lab: Colourimetry

Analytical Range: 0.5 to 10.00 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	172	8.00	8.16	0.16	0.328
b :	172	2.00	2.03	0.03	0.104
a+b :	172	10.00	10.19	0.19	0.419
a-b :	172	6.00	6.13	0.13	0.249
c :	172	2.00	2.03	0.03	0.104
d :	171	0.50	0.50	0.00	0.052
c+d :	171	2.50	2.53	0.03	0.146
c-d :	171	1.50	1.53	0.03	0.075

s.d.(AB): Sw(within run): 0.176 S(between runs): 0.243 S/Sw: 1.38
s.d.(CD): Sw(within run): 0.053 S(between runs): 0.082 S/Sw: 1.55

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.55 to 10.45 for A+B
5.70 to 6.30 for A-B
2.05 to 2.95 for C+D
1.20 to 1.80 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	148	0.00 - 1.00	0.126	27.5
	100	1.00 - 2.00	0.351	24.1
	144	2.00 - 5.00	0.474	14.5
	46	5.00 - 10.00	1.061	15.8
	438	Overall	0.475	N/A

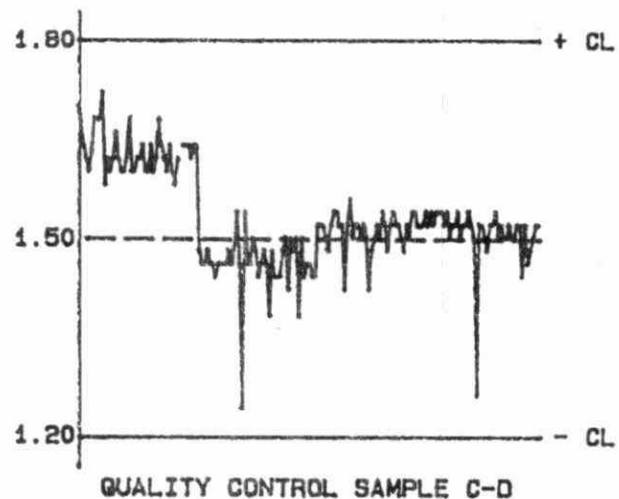
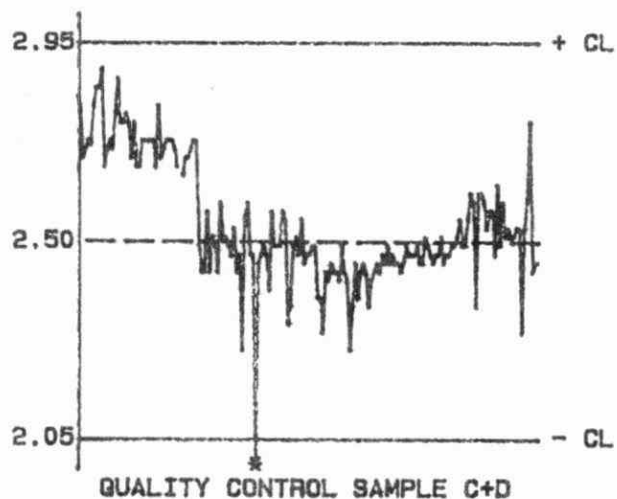
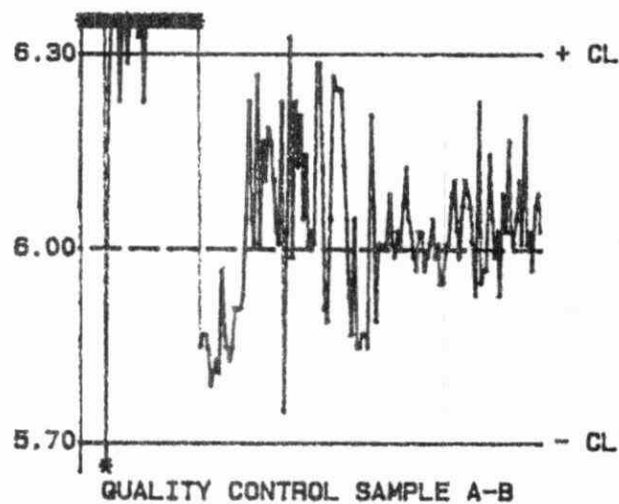
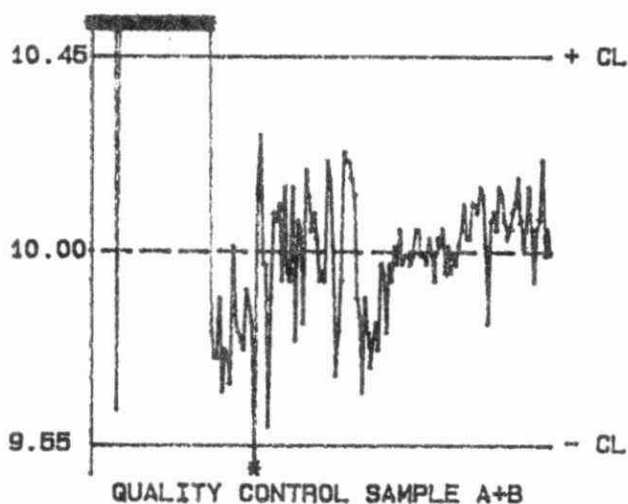
STANDARD DEVIATION (s.dupl): 0.126 W value: 0.1 T value: 0.5

OTHER CHECKS:

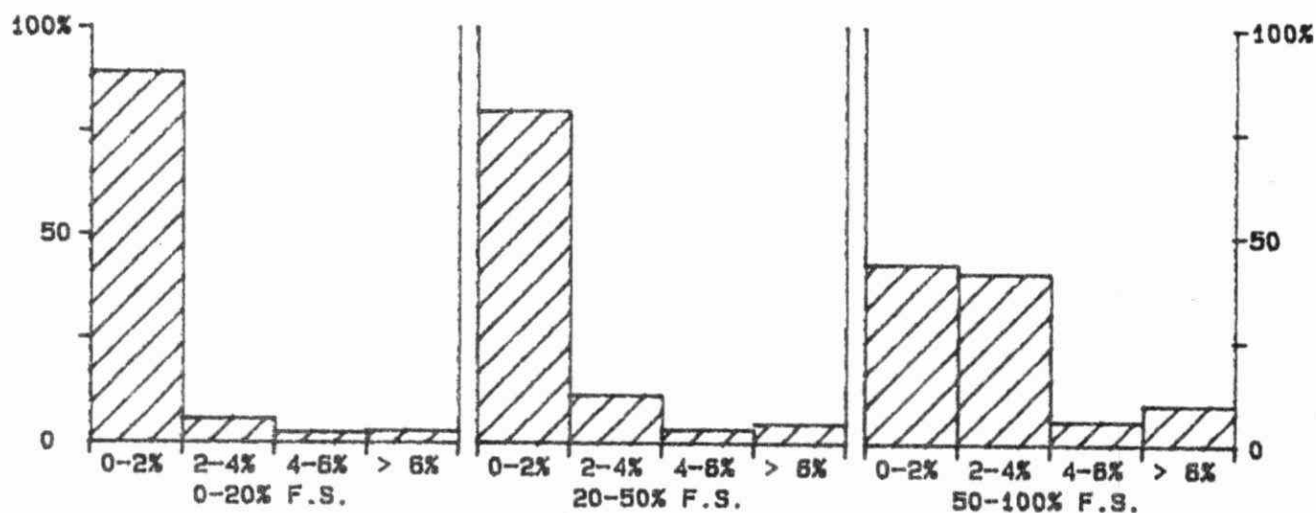
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	171	0.02	0.034

QUALITY CONTROL GRAPHS SILICON (MG/L AS SI)

FROM: 04/03/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



*** SILICON - REACTIVE SILICATES ***

IDENTIFICATION:

Laboratory : Rivers and Lakes Method Introduced: 01/02/75
LIS Test Name Code: SIO3UR Units : mg/L as Si
Work Station Code : RMSICL Unit Code : 064814
Method Code : 001BC2 Supervisor : J. Crowther
Sample Type/Matrix: Rivers, Lakes, Precipitation, Soil Extracts, Effluents,
Domestic Water Supplies, Leachates

SAMPLING:

Quantity Required: 50 mL
Container : Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference.
Approximate absorbance: 0.7 at the full scale level.
N.B. Chloride is determined simultaneously.

INSTRUMENTATION:

Boxed-FIA system consisting of basic automated modular continuous flow system plus the following modules: sample injection valve with air-flow controls, timer, bubble-gate. Colourimetric measurement is through a 5.0 cm. light path at 660 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA, QCB/C, QCD
Drift : BL plus 4 standards

MODIFICATIONS:

04/07/83 -Modules required for Boxed-FIA system were introduced. The number of calibration standards was increased from 2 to 10. The analytical rate was tripled. Concentrations of QC standards adjusted accordingly.
27/03/85 -Silicon analytical range was changed from 0-5.00mg/L to 0-10.00mg/L. First three months' data were omitted because they were not comparable with the later ones.

NOTES:

Calibration standard is a hydrate: $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$

04/03/86 -DISCONTINUED.

TEST TRANSFERRED TO ROM WORKSTATION.

SILICON - REACTIVE SILICATES
QUALITY CONTROL DATA FROM 08/01/86 TO 26/02/86

Lab: Rivers and Lakes

Analytical Range: 0.1 to 10.00 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	8	6.00	5.89	-0.11	0.148
b :	8	1.60	1.66	0.06	0.052
a+b :	8	7.60	7.54	-0.06	0.156
a-b :	8	4.40	4.23	-0.17	0.158
c :	8	1.60	1.62	0.02	0.044
d :	8	0.40	0.43	0.03	0.015
c+d :	8	2.00	2.05	0.05	0.045
c-d :	8	1.20	1.19	-0.01	0.048

s.d.(AB): SW(within run): 0.112 S(between runs): 0.111 S/Sw: 0.99
s.d.(CD): SW(within run): 0.034 S(between runs): 0.033 S/Sw: 0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.15 to 8.05 for A+B
4.10 to 4.70 for A-B
1.85 to 2.15 for C+D
1.10 to 1.30 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	8	0.00 - 0.50	0.034	8.9
	7	0.50 - 1.00	0.040	5.8
	2	1.00 - 2.50	0.034	2.2
	7	2.50 - 5.00	0.030	2.4
	1	5.00 - 10.00	N/A	N/A
	25	Overall	0.057	N/A

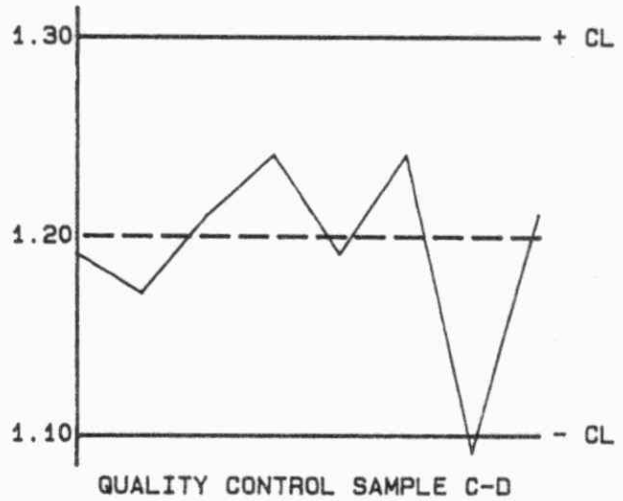
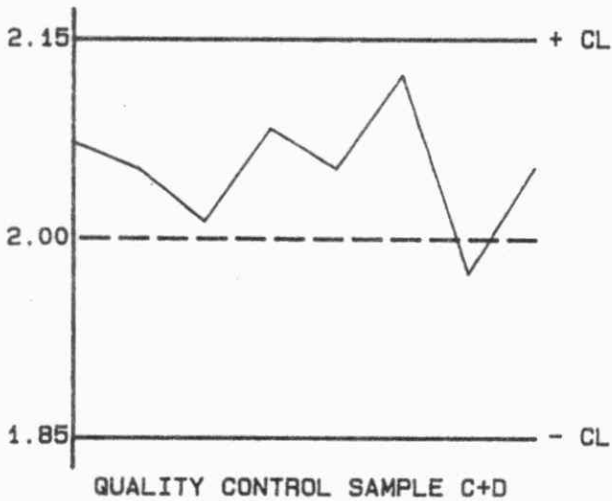
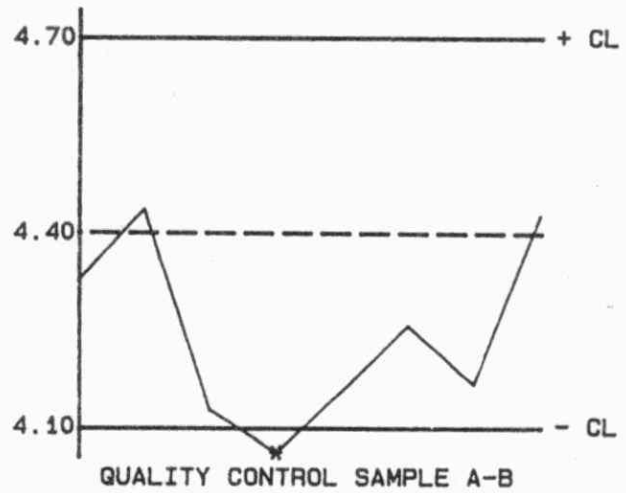
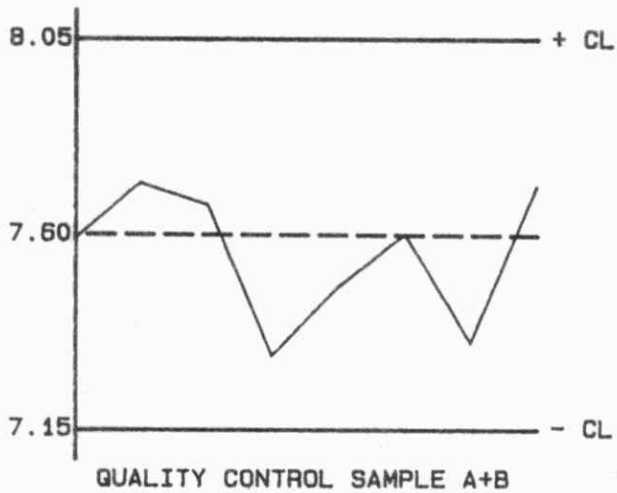
STANDARD DEVIATION (s.dupl): 0.034 W value: 0.02 T value: 0.1

OTHER CHECKS:

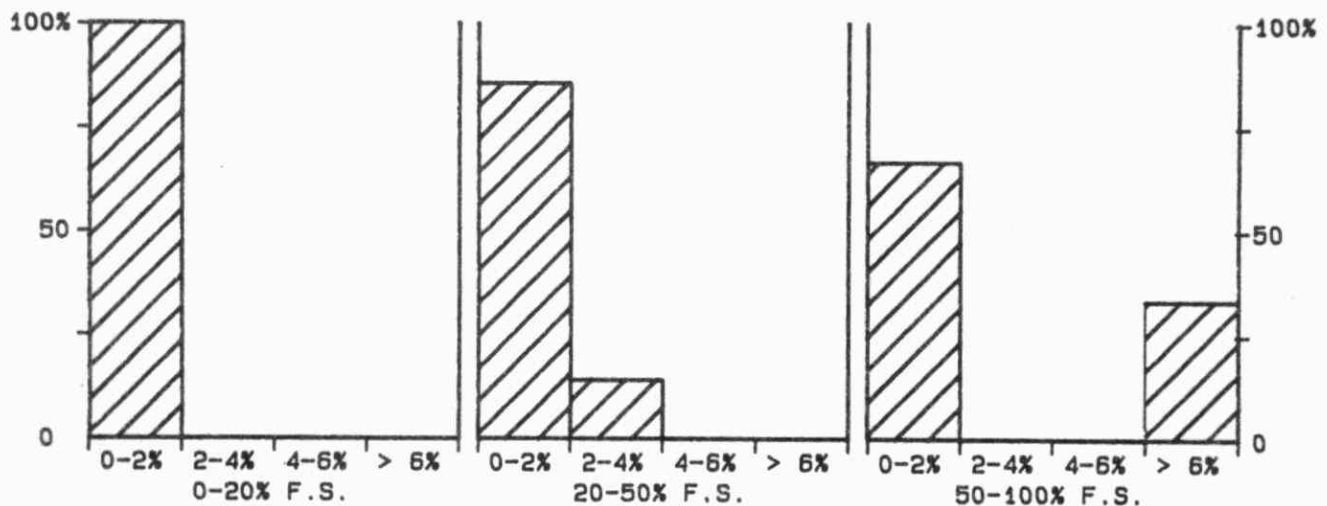
	Number of Data	Data Mean	Standard(1) Deviation
Std. Cal.	8	103	12.3
Long Term Blank	8	0.00	0.000

QUALITY CONTROL GRAPHS SILICON - REACTIVE SILICATES (MG/L AS SI)

FROM: 08/01/86
TO: 26/02/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS SI

*** SILT ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	SILT	Units	: % by weight
Work Station Code	: DOPARTSZ	Unit Code	: 070000
Method Code	: AM1002	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 20 g (dry <2 mm).
Container : glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

To prevent flocculation a portion of sample, pretreated for organic matter and carbonate removal, is dispersed in a sodium hexametaphosphate solution. The sand fraction (> 53 um) is removed by wet sieving; the silt and clay fraction is dispersed in a sedimentation cylinder. The percentage of silt in the sample is based on the settling velocities of spherical particles by the application of Stokes Law.

INSTRUMENTATION:

Sartorius 4 place digital balance (model 1201)
Balance accurate to 0.0001 g.

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Recovery : 2 long term soil samples representing different soil types plus
a round robin CSSC sample

NOTES:

Two recovery soils are alternated between batches, using their mean values.

SILT
QUALITY CONTROL DATA FROM 02/05/86 TO 20/06/86

Lab: Dorset Soils

Analytical Range: 5 to 100 % by wt.

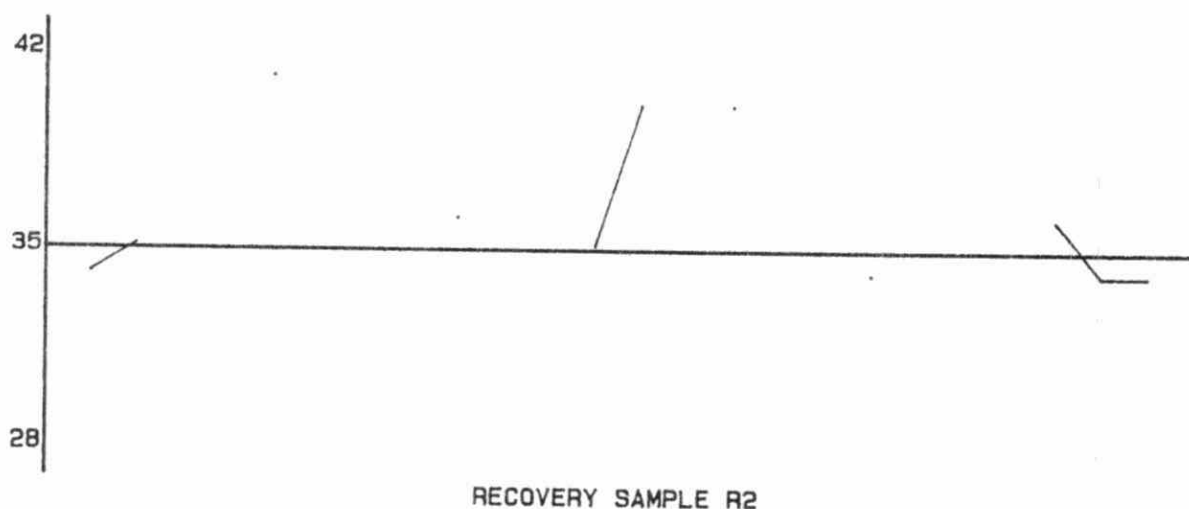
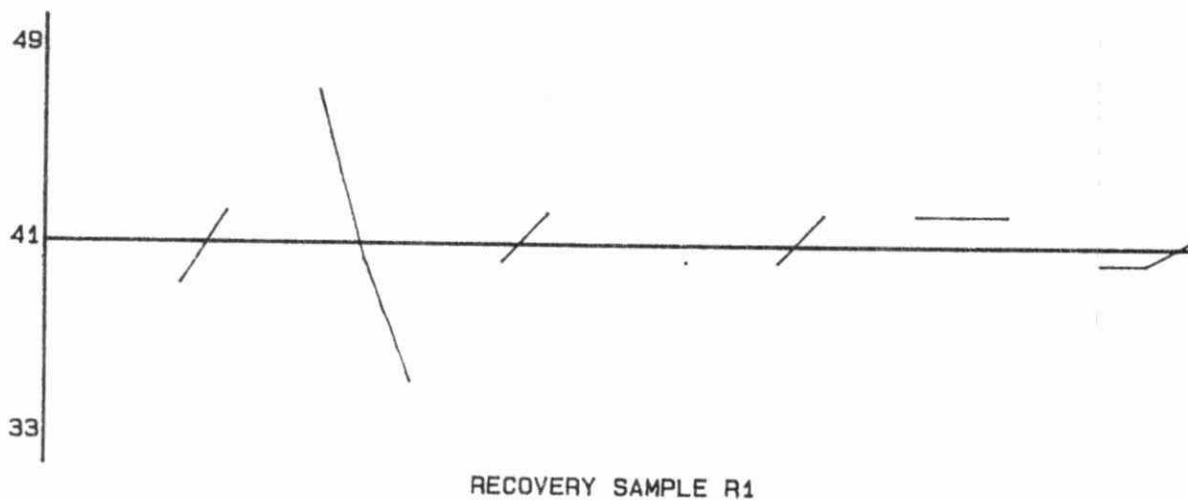
RECOVERIES:		Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
		-----	-----	-----	-----
r1	:	17	41	41	2.4
r2	:	11	35	36	2.7

DUPLICATES:		Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
		-----	-----	-----	-----
		8	0 - 20	1.0	11.7
		11	20 - 50	2.0	6.6
		6	50 - 100	1.3	1.9
		25	Overall	1.6	N/A

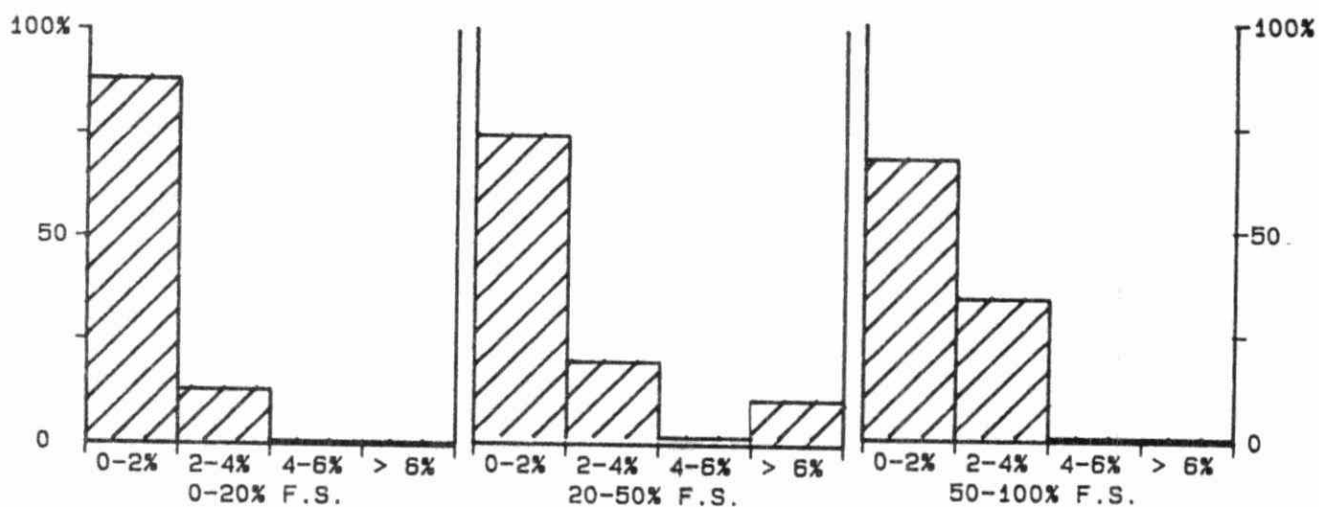
STANDARD DEVIATION (s.dupl): 1.0 W value: 1 T value: 5

QUALITY CONTROL GRAPHS SILT (% BY WT.)

FROM: 02/05/86
TO: 20/06/86



--- EXPECTED VALUE
* DATA > 15% OUTSIDE CL



*** SODIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 18/05/79
LIS Test Name Code: NAUR Units : mg/L as Na
Work Station Code : PRAA Unit Code : 064811
Method Code : 002EA1 Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow

SAMPLING:

Quantity Required: 5 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Samples are analysed by AAS at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer (AAS) system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of Commodore PET microcomputer for data capture and data reduction. Sample required reduced to 5 mL.

SODIUM
QUALITY CONTROL DATA FROM 06/01/86 TO 22/12/86

Lab: Atomic Absorption

Analytical Range: 0.05 to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	72	0.600	0.595	-0.005	0.0071
b :	71	0.100	0.104	0.004	0.0103
a+b :	71	0.700	0.698	-0.002	0.0139
a-b :	71	0.500	0.491	-0.009	0.0110

s.d.(AB): Sw(within run): 0.0078 S(between runs): 0.0088 S/Sw: 1.14

On any given day the calibration is accepted if the values obtained lie within the ranges:

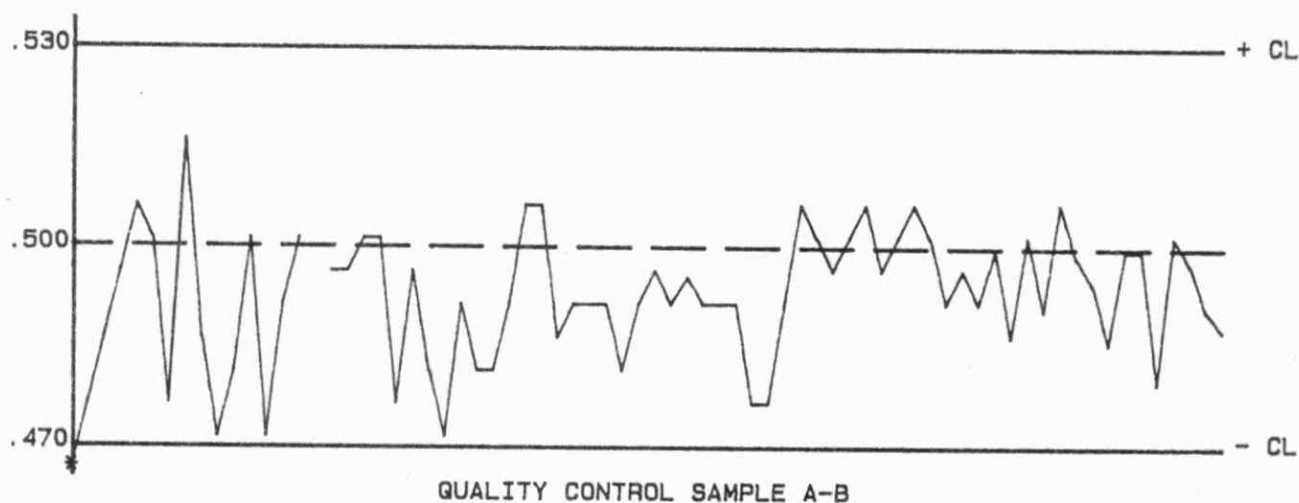
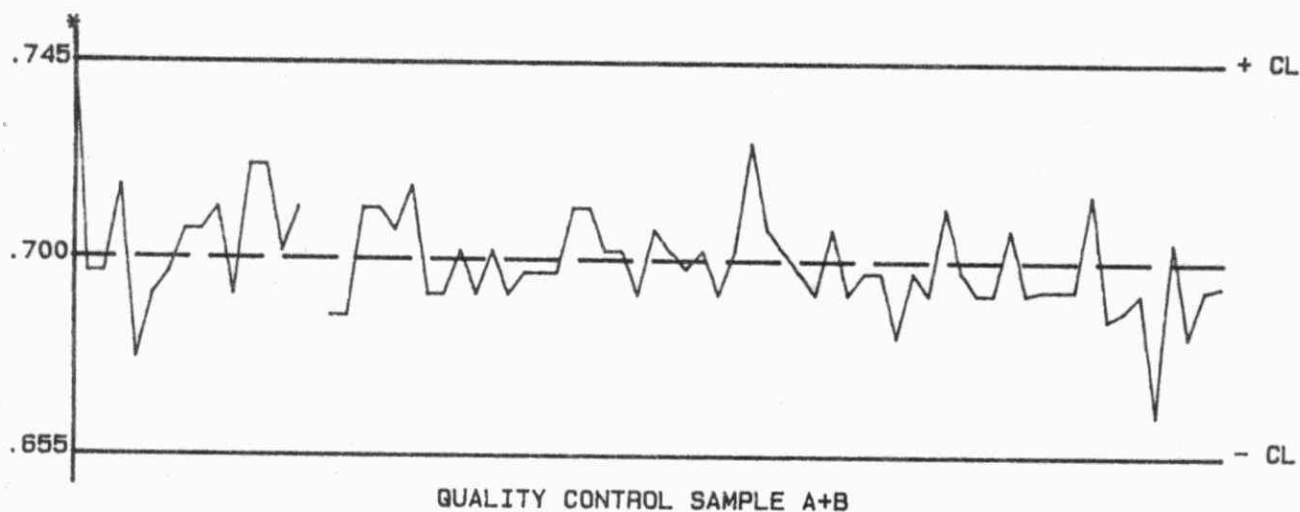
0.655 to 0.745 for A+B
0.470 to 0.530 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	140	0.000 - 0.100	0.0101	28.0
	23	0.100 - 0.200	0.0057	4.2
	17	0.20 - 1.00	0.020	5.3
	180	Overall	0.011	N/A

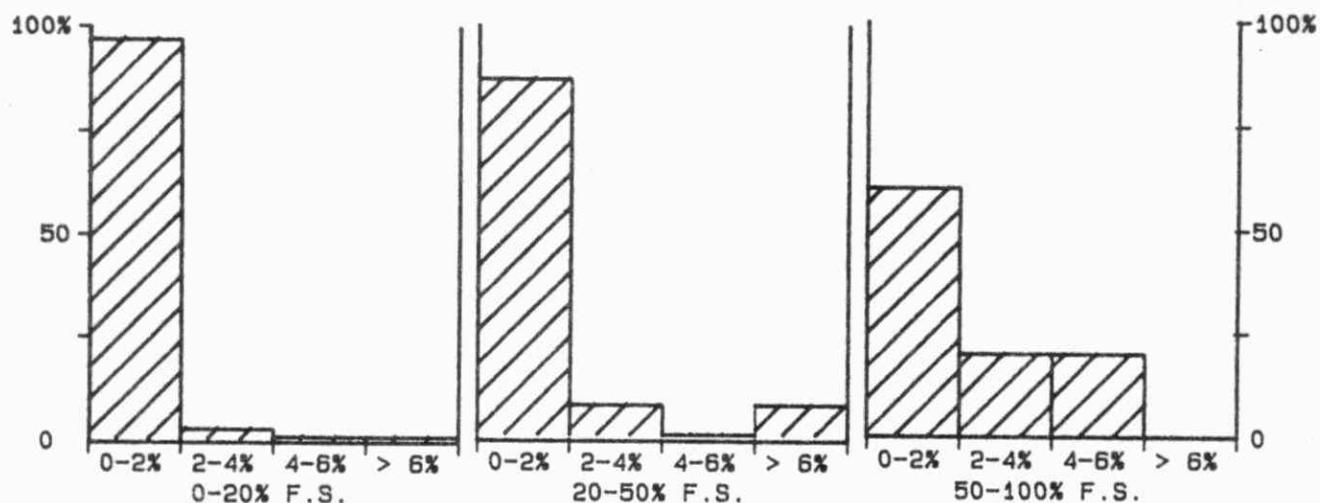
STANDARD DEVIATION (s.dupl): 0.0101 W value: 0.01 T value: 0.05

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 06/01/86
TO: 22/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1 MG/L AS NA

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced:	01/04/74
LIS Test Name Code:	NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: F. Tomassini
Sample Type/Matrix:	Rivers, Lakes, Soil Extracts, Effluents.		

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at the full scale value

INSTRUMENTATION:

Automated flow injection absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

01/12/81 -Calibration range became 10.0 mg/L full scale; second analytical range was dropped.

01/03/84 -Analytical range (RMNAKH) was added; full scale: 2.00 mg/L. This range is currently restricted to special programs.

01/08/84 -Analytical range (RMNAKH) was increased from 10.0 to 20.0 mg/L full scale. Calibration technique was changed from quadratric to linear interpolation. Potassium is no longer determined simultaneously.

25/09/85 -Calibration range remains at 20.0 mg/L full scale but second analytical range was dropped. Concentrations of QC standards were adjusted accordingly. Commodore PET microcomputer controlled system with sample flow injection introduced.

1985 -Three analytical ranges were used during 1985: 2.00, 20.0, and 20.0 mg/L as Na full scale.

SODIUM
QUALITY CONTROL DATA FROM 07/01/86 TO 30/12/86

Lab: Atomic Absorption

Analytical Range: 0.1 to 20.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	131	16.00	16.02	0.02	0.192
b :	134	1.40	1.39	-0.01	0.040
a+b :	131	17.40	17.41	0.01	0.201
a-b :	131	14.60	14.64	0.04	0.190

s.d.(AB): Sw(within run): 0.134 S(between runs): 0.139 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

16.50 to 18.30 for A+B
14.00 to 15.20 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	156	0.00 - 1.00	0.044	7.2
	43	1.00 - 2.00	0.038	2.5
	48	2.00 - 4.00	0.074	2.4
	53	4.00 - 10.00	0.109	1.7
	23	10.00 - 20.00	0.232	1.4
	323	Overall	0.088	N/A

STANDARD DEVIATION (s.dupl): 0.044

W value: 0.02

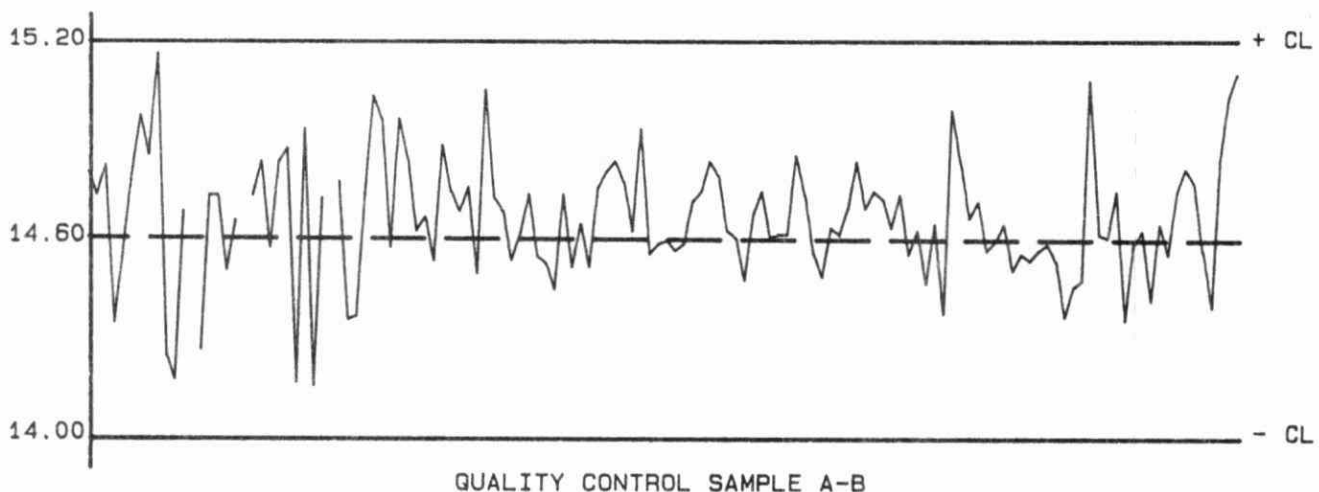
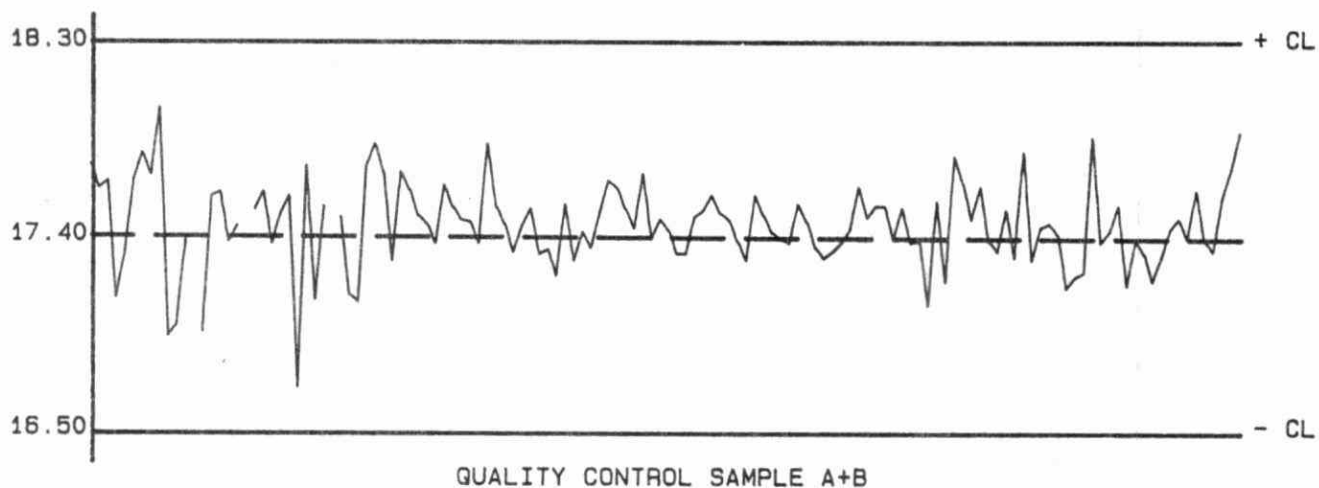
T value: 0.1

OTHER CHECKS:

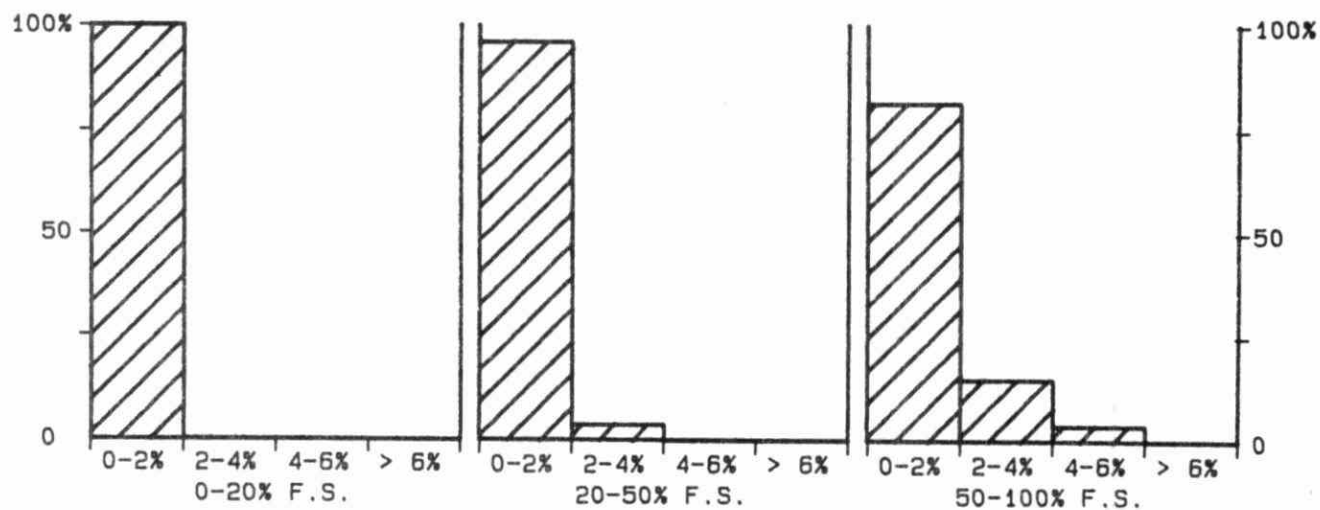
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	128	1.200	0.0800
Long Term Blank :	123	-0.00	0.023

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 07/01/86
TO: 30/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS NA

*** SODIUM ***

IDENTIFICATION:

Laboratory : Atomic Absorption Method Introduced: 08/04/86
LIS Test Name Code: NAUR Units : mg/L as Na
Work Station Code : WAAS Unit Code : 064811
Method Code : 001EA1 Supervisor : F. Tomassini
Sample Type/Matrix: Domestic Waters, Leachates, Effluents

SAMPLING:

Quantity Required: 10 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.1 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption system (AAS).

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

08/04/86 -All sample classes moved to WAAS workstation. Single analytical range changed from full scale value 200 mg/L to 100 mg/L. Number of calibration standards increased from 2 to 10. Concentration of QC solutions adjusted accordingly. Commodore PET microcomputer system control and data handling introduced with linear interpolation of calibration technique. Sample flow injection was introduced.

SODIUM
QUALITY CONTROL DATA FROM 08/04/86 TO 31/12/86

Lab: Atomic Absorbtion

Analytical Range: 1 to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	94	80.0	79.6	-0.4	0.84
b :	94	7.00	6.98	-0.02	0.278
a+b :	94	87.00	86.55	-0.45	0.911
a-b :	94	73.00	72.60	-0.40	0.852

s.d.(AB): Sw(within run): 0.60 S(between runs): 0.63 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

82.50 to 91.50 for A+B
70.00 to 76.00 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	49	0.00 - 5.00	0.258	9.0
	40	5.00 - 10.00	0.290	4.2
	62	10.0 - 25.0	0.37	2.1
	38	25.0 - 50.0	0.53	1.5
	22	50.0 - 100.0	1.23	1.7
	211	Overall	0.53	N/A

STANDARD DEVIATION (s.dup1): 0.258

W value: 0.2

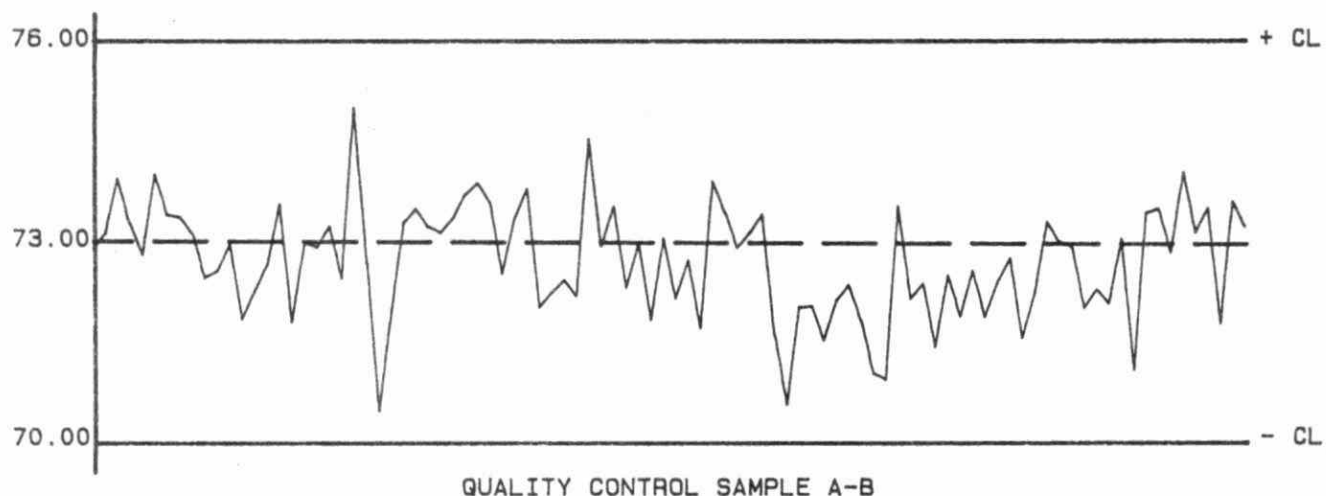
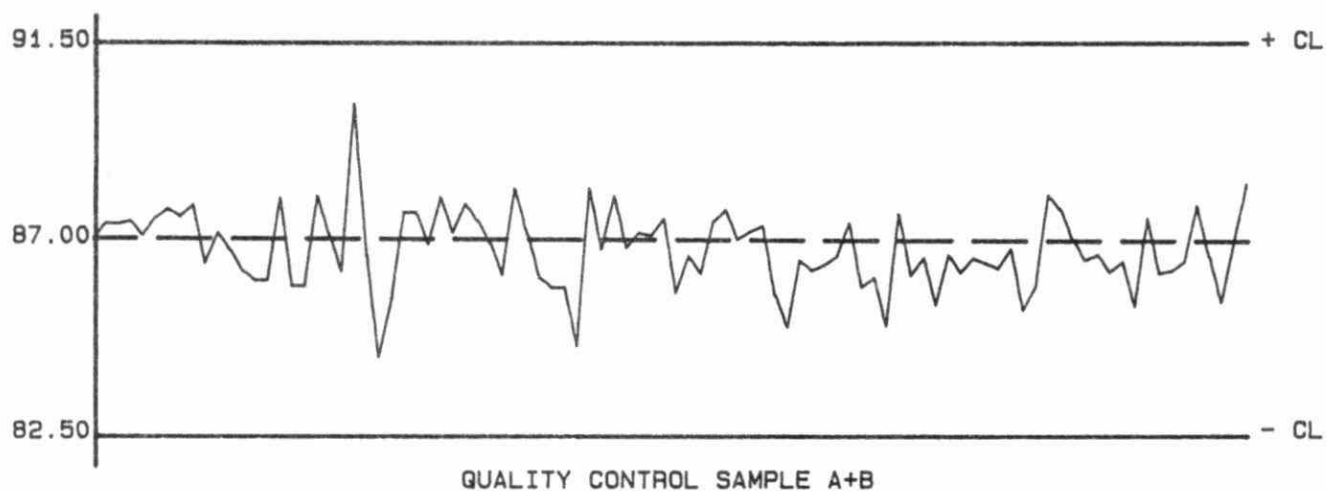
T value: 1

OTHER CHECKS:

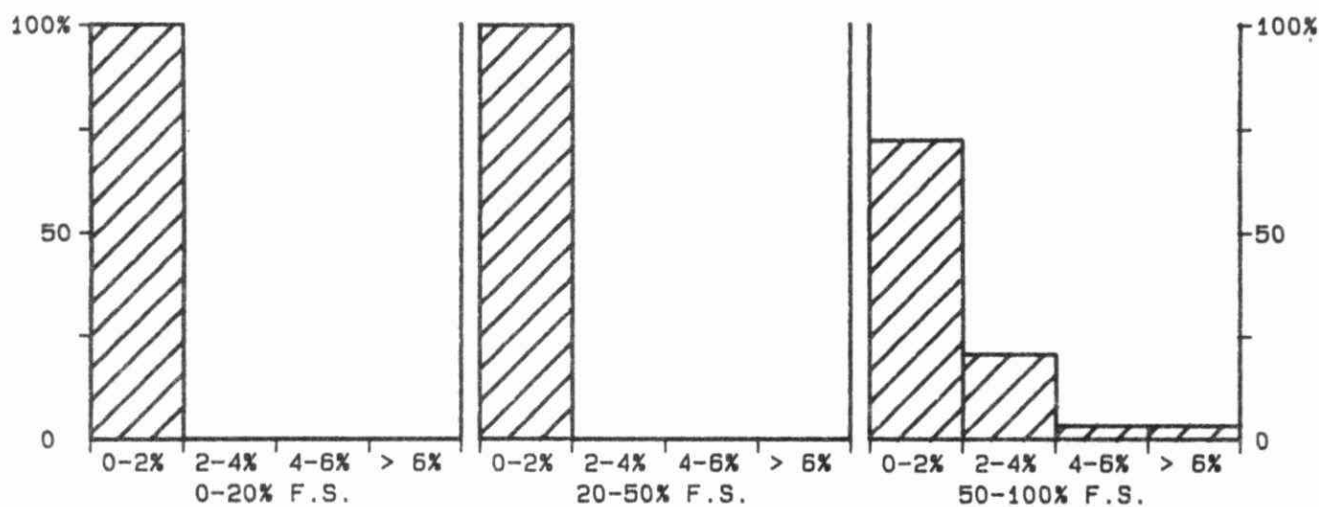
	Number of Data	Data Mean	Standard(1) Deviation
Absorbance :	59	1.089	0.0843
Long Term Blank :	92	0.01	0.169

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 08/04/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS NA

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Domestic Water	Method Introduced:	Before '74
LIS Test Name Code:	NAUR	Units	: mg/L as Na
Work Station Code	: WNAK	Unit Code	: 064811
Method Code	: 002BA1	Supervisor	: P. Campbell
Sample Type/Matrix: Domestic Waters, Leachates, Effluents			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.16 at the 50 mg/L level.

INSTRUMENTATION:

Automated modular continuous flow atomic absorption system (AAS). Two analytical ranges are obtained from the output of the AAS.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : BL plus 3 standards

MODIFICATIONS:

08/04/86 -THIS TEST WAS ASSIGNED TO THE WAAS WORKSTATION.

SODIUM
QUALITY CONTROL DATA FROM 03/01/86 TO 25/02/86

Lab: Domestic Water

Analytical Range: 1 to 200 mg/l as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	15	130	130	0	0.8
b :	15	33	34	1	0.6
a+b :	15	163	163	0	1.0
a-b :	15	97	96	-1	1.0
c :	15	32.5	33.3	0.8	0.31
d :	15	6.5	6.5	0.0	0.09
c+d :	15	39.0	39.8	0.8	0.36
c-d :	15	26.0	26.9	0.9	0.28

s.d.(AB): Sw(within run): 0.7 S(between runs): 0.7 S/Sw: 1.00
s.d.(CD): Sw(within run): 0.20 S(between runs): 0.23 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

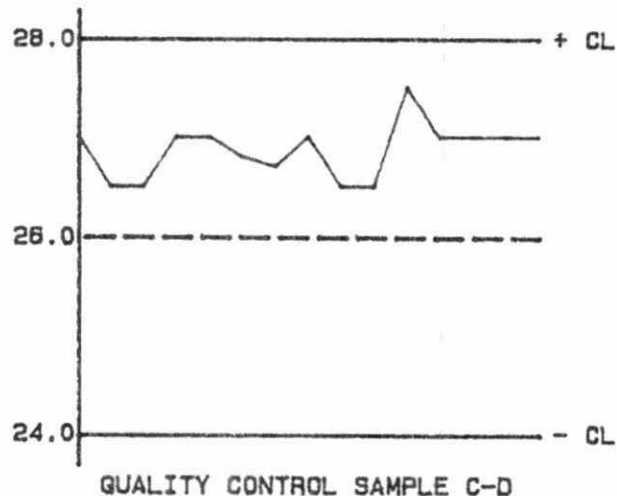
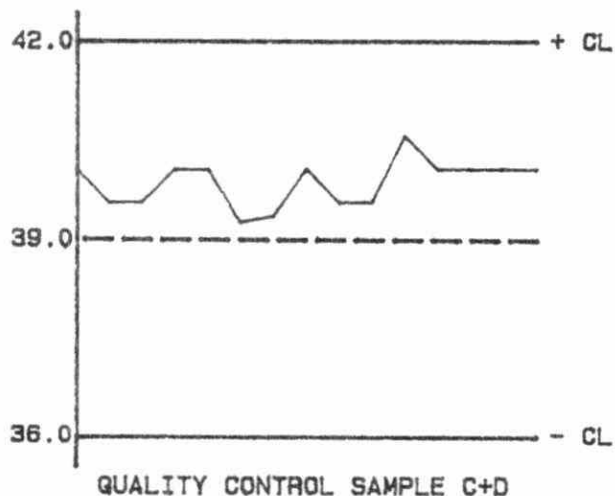
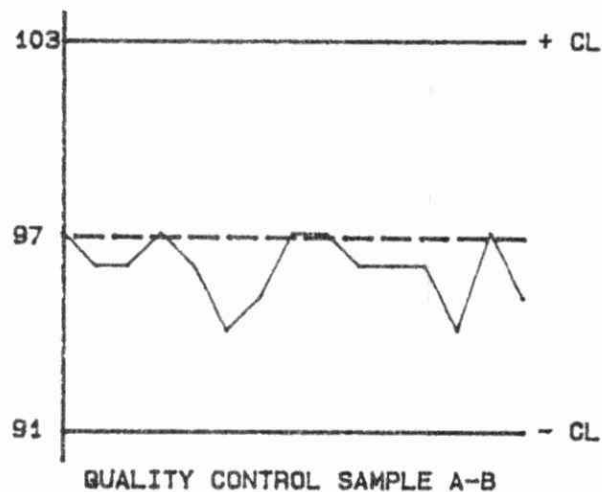
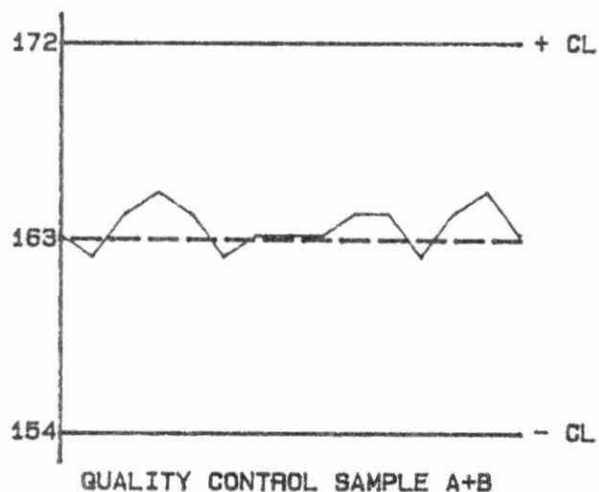
154 to 172 for A+B
91 to 103 for A-B
36.0 to 42.0 for C+D
24.0 to 28.0 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	13	0 - 10	0.3	6.1
	14	10 - 20	0.29	2.0
	8	20 - 50	0.3	1.0
	5	50 - 100	0.3	0.4
	4	100 - 200	0.8	0.6
	44	Overall	0.4	N/A

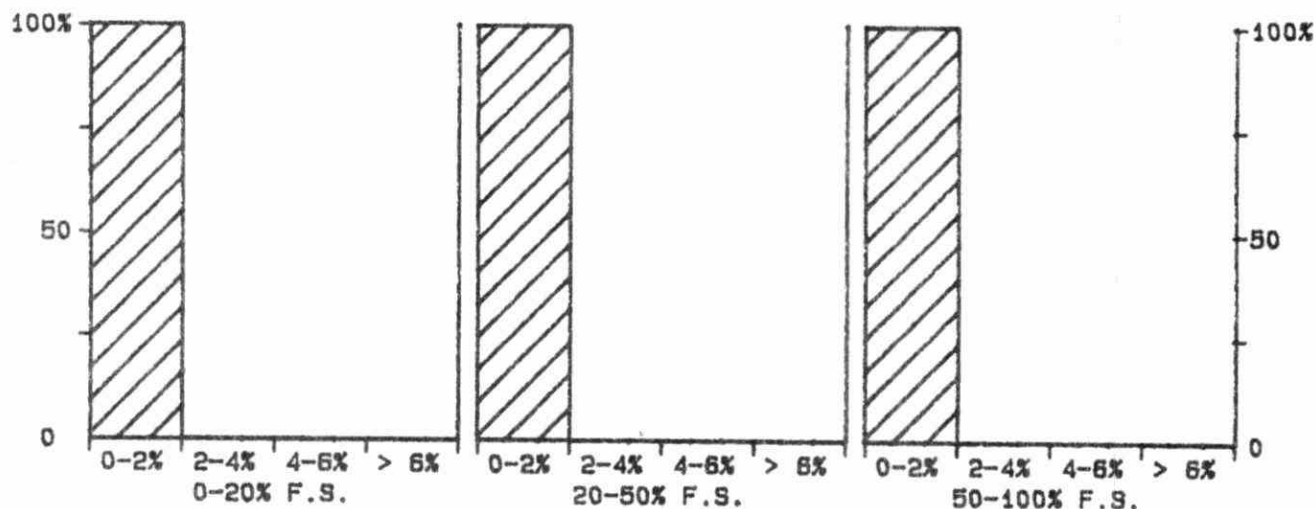
STANDARD DEVIATION (s.dupl): 0.3 W value: 0.2 T value: 1

QUALITY CONTROL GRAPHS SODIUM (MG/L AS NA)

FROM: 03/01/86
TO: 25/02/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS NA

*** SODIUM ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 18/05/79
LIS Test Name Code: NAUR Units : ug/filter as Na
Work Station Code : PRLOV Unit Code : 361811
Method Code : 004AA3 Supervisor : F. Tomassini
Sample Type/Matrix: W40 filters from LoVol filter pack.

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bags

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analysed by AAS (workstation PRAA) at 589.0 nm with an air-acetylene flame. Potassium is added as a suppressant via an automated sampling train. Results are converted to ug/filter as Na.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular flow injection atomic absorption spectrophotometer(AAS) system

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL every 10 samples; 2 standards every 20 samples

MODIFICATIONS:

July 81 - Addition of analysis for sodium W40 filters from LoVol filter pack was introduced.

17/05/85 -Three additional calibration standards were set up. Flow injection introduction of sample was adopted. System was further automated with the addition of a microcomputer to co-ordinate sampler, injection, AAS "read", and data reduction. Sample required reduced to 5 mL.

NOTES:

W and T values are those of the PRAA workstation multiplied by 50 to yield ug/filter.

*** SOLIDS - DISSOLVED ***

IDENTIFICATION:

Laboratory	: Rivers and Lakes	Method Introduced:	Before '61
LIS Test Name Code:	RSF	Units	: mg/L
Work Station Code	: RMTSDS	Unit Code	: 064000
Method Code	: 101A15	Supervisor	: J. Crowther
Sample Type/Matrix: Rivers, Lakes, Effluents			

SAMPLING:

Quantity Required: 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sample (shaken) is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103 to 105 C, and stored in a dessicator for at least 24 hours. After reweighing the dissolved residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance(4/5-decimal places), drying oven, suction filtration apparatus, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Calculated W value: N/A T value: N/A

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 2 S class weights, eg, QCA
Recovery : LTBL plus 2 standards, eg, R1
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

15/01/82 -QC program was expanded to include recovery standards
01/05/84 -Microcomputer control was introduced
26/03/86 -TEST TRANSFERRED TO SOLIDS AND BOD FROM RIVERS AND LAKES (100 mL aliquot and Teflon dishes used).

NOTES:

*Dissolved solids in surface waters normally are estimated when the conductivity of the sample is less than 400 uS/cm:

$$\text{Dissolved solids(mg/L)} = 0.65 \times \text{Conductivity(uS/cm)}$$

Hence, few data from direct measurements at low concentrations are available to calculate the detection criterion of this gravimetric test.

SOLIDS - DISSOLVED
QUALITY CONTROL DATA FROM 02/01/86 TO 24/03/86

Lab: Rivers and Lakes

Analytical Range: N/A to 1000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	29	50.0000	50.0005	0.0005	0.00009
b :	29	10.0000	10.0001	0.0001	0.00006
a+b :	29	60.0000	60.0006	0.0006	0.00012
a-b :	29	40.0000	40.0004	0.0004	0.00010

s.d.(AB): Sw(within run): 0.00007 S(between runs): 0.00008 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

59.998 to 60.001 for A+B
 39.998 to 40.001 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	20	800	800	14.0
r2 :	19	300	298	10.0

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
0	0 - 50	N/A	N/A
0	50 - 100	N/A	N/A
4	100 - 250	11.1	4.9
24	250 - 500	12.3	3.6
6	500 - 1000	14.8	2.2
34	Overall	12.7	N/A

STANDARD DEVIATION (s.dupl): N/A

W value: N/A

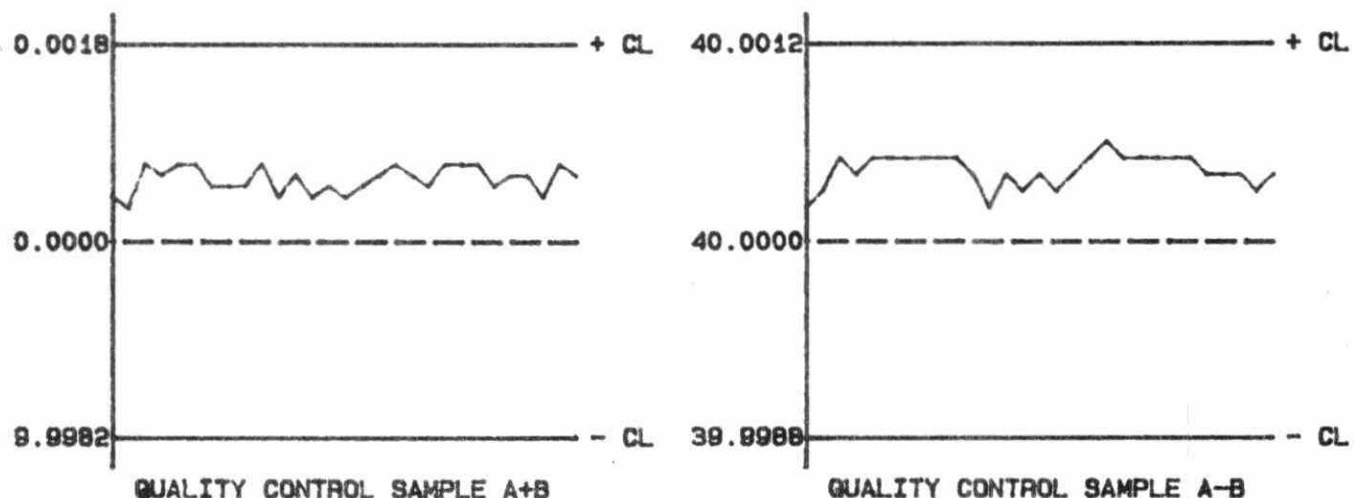
T value: N/A

OTHER CHECKS:

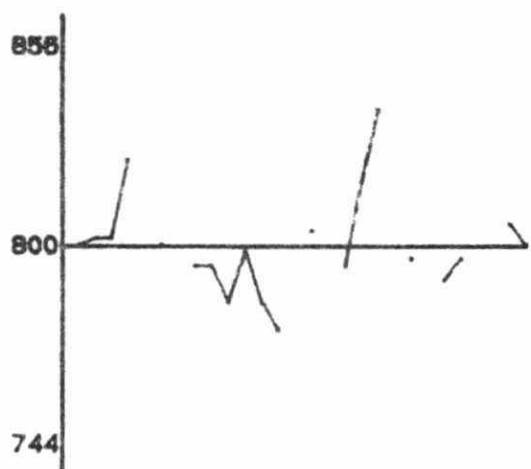
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	0	N/A	N/A

QUALITY CONTROL GRAPHS SOLIDS - DISSOLVED (MG/L)

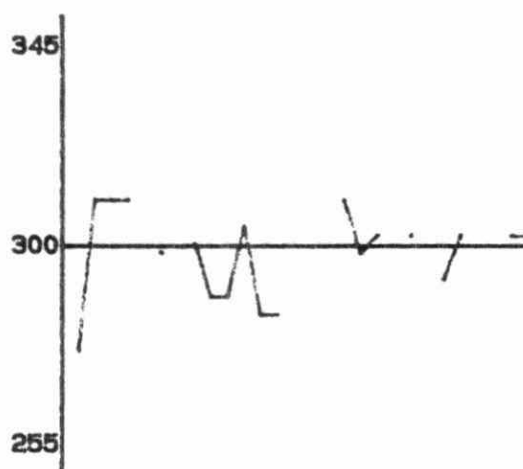
FROM: 02/01/88
TO: 24/03/88



--- EXPECTED VALUE
— CONTROL LIMIT (CL)

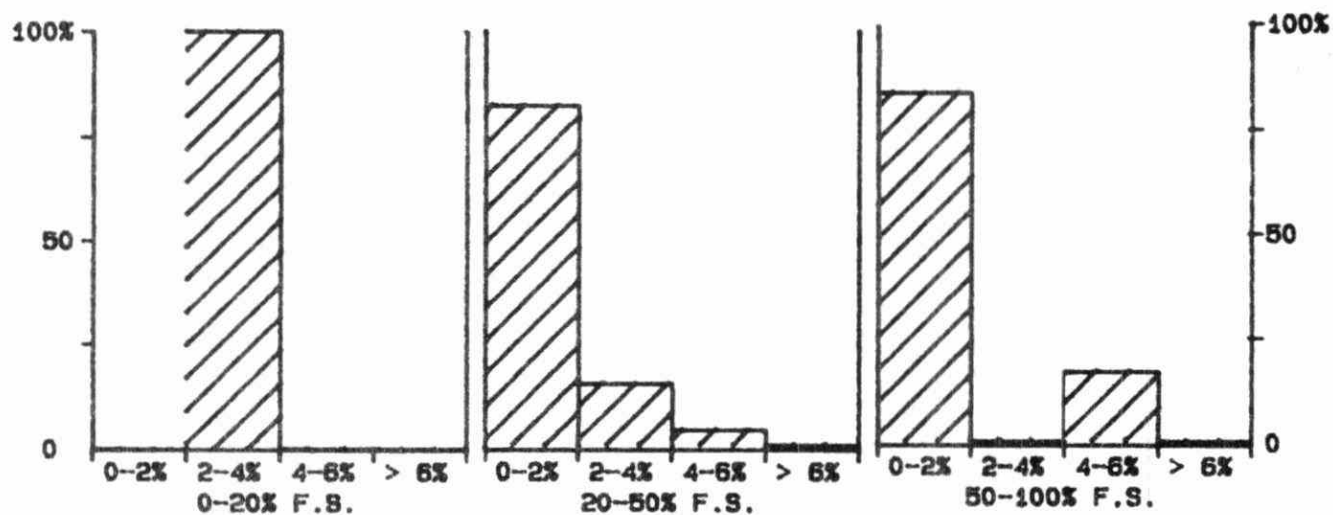


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L

*** SOLIDS - DISSOLVED ***

IDENTIFICATION:

Laboratory : Solids and BOD Method Introduced: Before '61
LIS Test Name Code: RSF Units : mg/L
Work Station Code : SOLIDS Unit Code : 064000
Method Code : 106AB4 Supervisor : P. Campbell
Sample Type/Matrix: Sewage, Industrial Waste, Leachate, Domestic Waters,
Effluents

SAMPLING:

Quantity Required: 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103 to 105 C, and stored in a dessicator for at least 24 hours. After reweighing the dissolved residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance(4/3-decimal places),drying oven, suction filtration apparatus, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5# T value: 25

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 2 S class weights, eg, QCA
Recovery : LTBL plus 2 standards, eg, R1
Drift : Balance zero is checked at least every 20 dishes.

MODIFICATIONS:

15/01/82 -Microcomputer control was introduced
01/07/85 -Teflon dishes replaced ceramic dishes and aliquot volume increased to 100 mL for most samples.
01/12/86 -Correction factor for dish tare weights was included in calculation, based on variations of a standard sealed vessel.

NOTES:

As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are only listed once: in the Solids-Total report.

SOLIDS - DISSOLVED
QUALITY CONTROL DATA FROM 10/01/86 TO 16/12/86

Lab: Solids and BOD

Analytical Range: 25 to 3000 mg/L

RECOVERIES:	Number of Data	Expected Concn	Av. Conc. Measured	Standard(1) Deviation
	-----	-----	-----	-----
r1 :	18	2000	2005	6.4
r2 :	18	500	501	4.2

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	4	0.0 - 200.0	6.84	10.2
	7	200 - 400	8.3	2.5
	16	400 - 600	10.4	2.1
	4	600 - 1000	11.6	1.5
	2	1000 - 3000	7.6	0.6
	33	Overall	9.6	N/A

STANDARD DEVIATION (s.dupl): 7.77

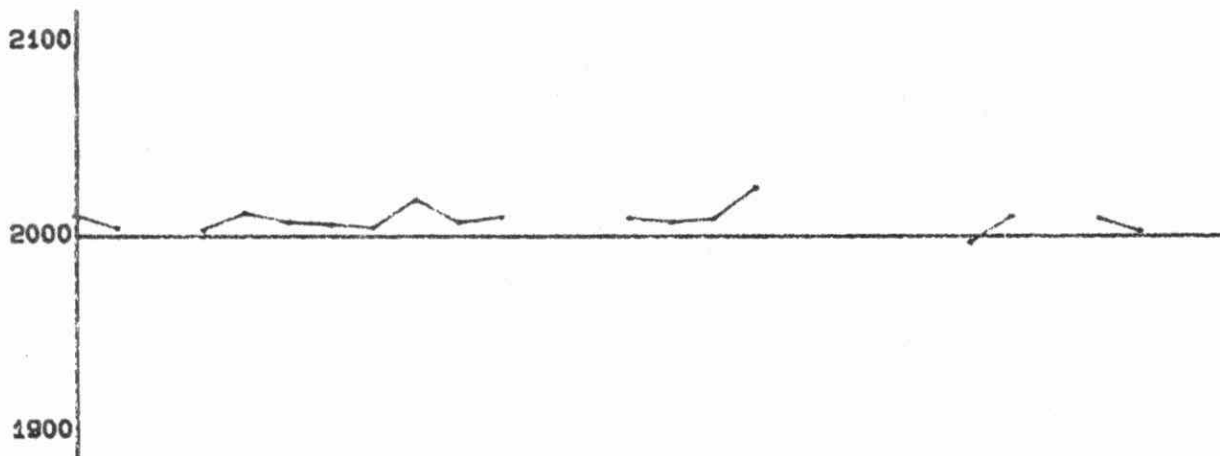
W value: 5

T value: 25

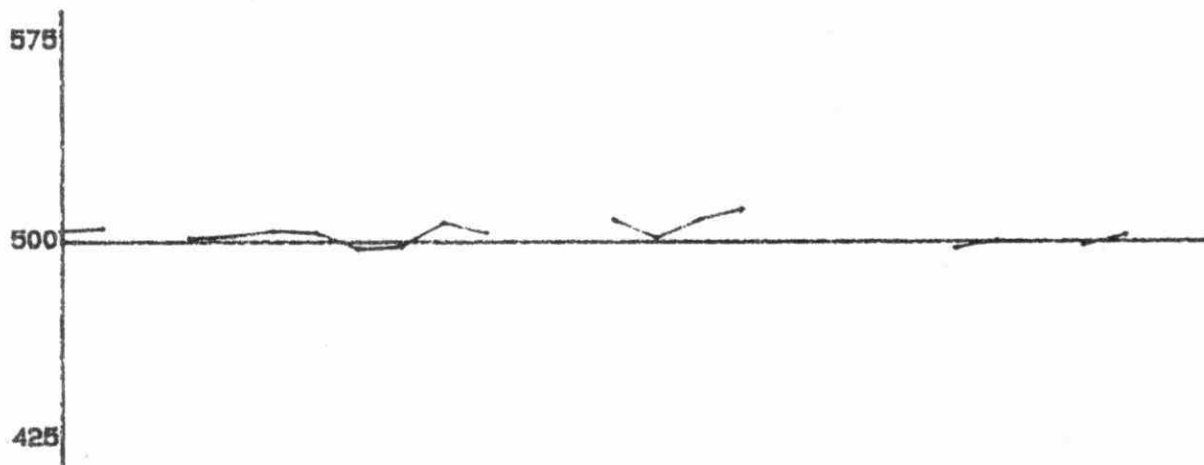
OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Filter Wash Change :	25	0.24	2.995

QUALITY CONTROL GRAPHS SOLIDS - DISSOLVED (MG/L)

FROM: 10/01/86
TO: 16/12/86

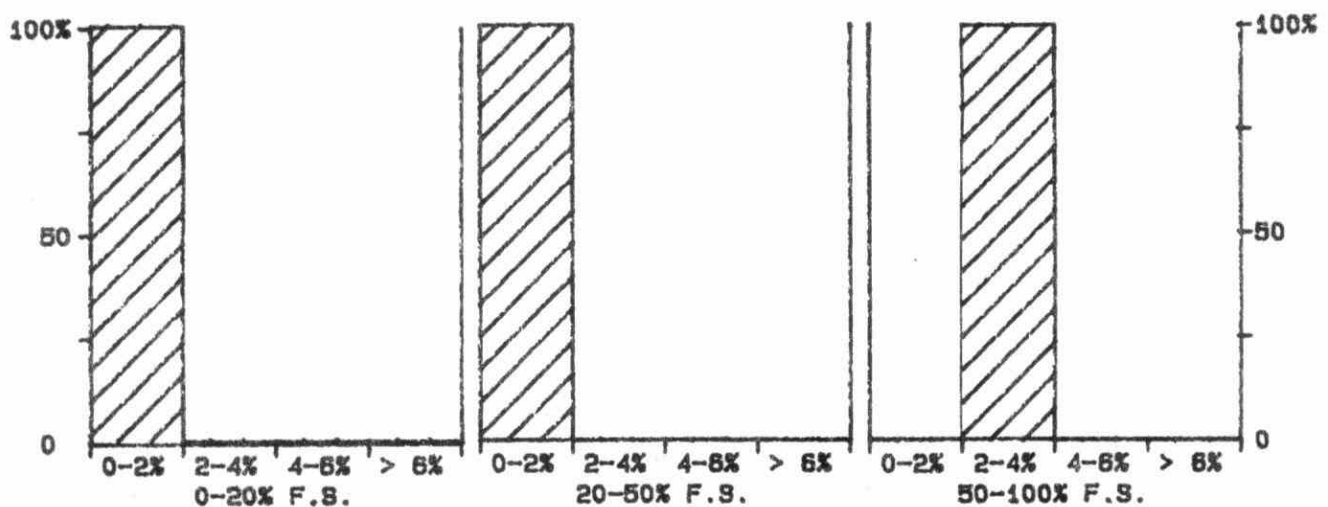


RECOVERY SAMPLE R1



RECOVERY SAMPLE R2

— EXPECTED VALUE
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

*** SOLIDS - IGNITED ***

IDENTIFICATION:

Laboratory : Solids and BOD Method Introduced: Before '61
LIS Test Name Code: RSFA,RSPA,RSTA Units : mg/L or mg/Kg
Work Station Code : SOLIDS Unit Code : 064000
Method Code : 107AB4,207AB5,507AB4 Supervisor : P. Campbell
Sample Type/Matrix: Sewage, Industrial Waste, Domestic Waters, Leachate, Effluents

SAMPLING:

Quantity Required: 75-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for dissolved, particulate, or total solids is followed and the dried residue is ignited at 600 C for one hour in a muffle furnace. As soon as practical the dish is transferred to a desiccator to cool. The ignited or ash weight is obtained as the difference between the final ignited weight and the original dish weight. Similarly the volume used in the ignited calculations is the volume selected for the original dried solids measurement. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance(4/5 decimal places), muffle furnace, ceramic dishes, Petri dishes
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Calculated Wvalue: 10#,5#,20 Tvalue: 50,25,100

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 4 S class weights, eg, QCA
Drift : Balance zero is checked at least every 20 dishes

MODIFICATIONS:

01/05/82 -Microcomputer control was introduced

NOTES:

-In the order listed above, W and T values refer to the residual ash after ignition of the dried residual from dissolved, particulate, and total solids determinations.
-Duplicate data refer to ash residuals rather than loss on ignition.
-Detection criteria estimates are unreliable due to limited data; samples requiring these tests are usually sewage sludges with high solids contents.
-As the same two balances are used for all solids analyses in the Sewage/Industrial laboratory, the calibration control data are only listed once: in the Solids-Total report for Ignited Dissolved and Ignited Total tests, and in the Solids-Particulate report for Ignited Particulate tests.

SOLIDS - DISSOLVED IGNITED
QUALITY CONTROL DATA FROM 27/01/86 TO 16/12/86

Lab: Solids and BOD

Analytical Range: - to 3000 mg/L

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	5	0.0 - 200.0	9.60	5.9
	4	200 - 400	10.6	3.5
	1	400 - 600	N/A	N/A
	3	600 - 1000	7.8	1.1
	4	1000 - 3000	23.2	1.7
	17	Overall	14.0	N/A

STANDARD DEVIATION (s.dup1): 10.04

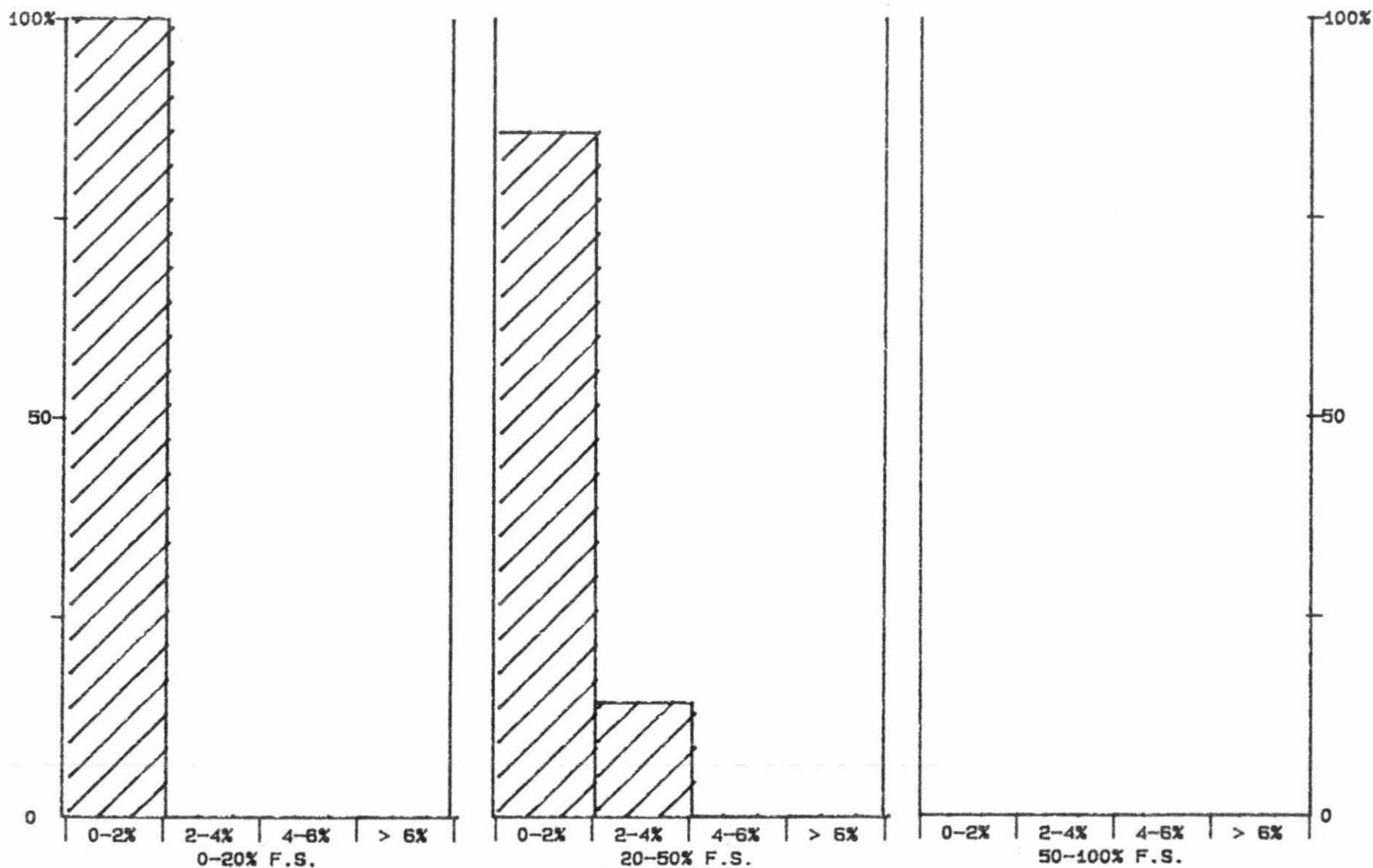
W value: 10

T value: 50

OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Filter Wash Change :	6	-4.32	5.525

QUALITY CONTROL GRAPH
SOLIDS - DISSOLVED IGNITED (MG/L)

FROM: 27/01/86
TO: 16/12/86



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

SOLIDS - PARTICULATE IGNITED
QUALITY CONTROL DATA FROM 02/01/86 TO 22/12/86

Lab: Solids and BOD

Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	51	0.50002	0.49998	-0.00004	0.000015
b :	51	0.05002	0.04998	-0.00003	0.000016
a+b :	51	0.55004	0.54997	-0.00007	0.000025
a-b :	51	0.45000	0.44999	-0.00001	0.000018

s.d.(AB): SW(within run):0.000013 S(between runs):0.000016 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.5470 to 0.5530 for A+B
0.4480 to 0.4520 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
6	0.0 - 100.0	3.11	7.7
2	100 - 500	14.6	3.6
7	500 - 1000	29.9	4.2
1	1000 - 1500	N/A	N/A
2	1500 - 3000	113.6	5.0
18	Overall	42.8	N/A

STANDARD DEVIATION (s.dup1): 5.98

W value: 5

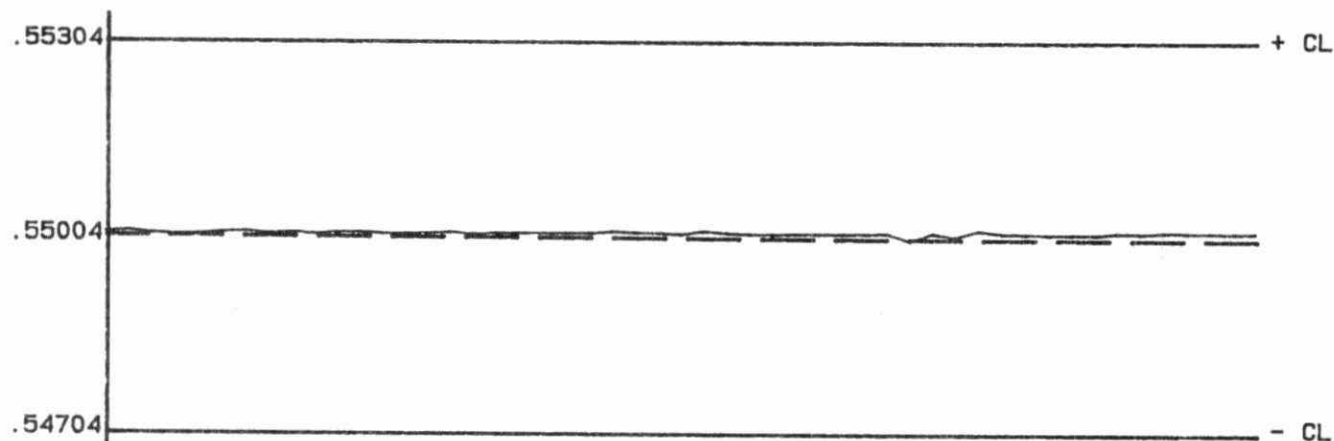
T value: 25

OTHER CHECKS:

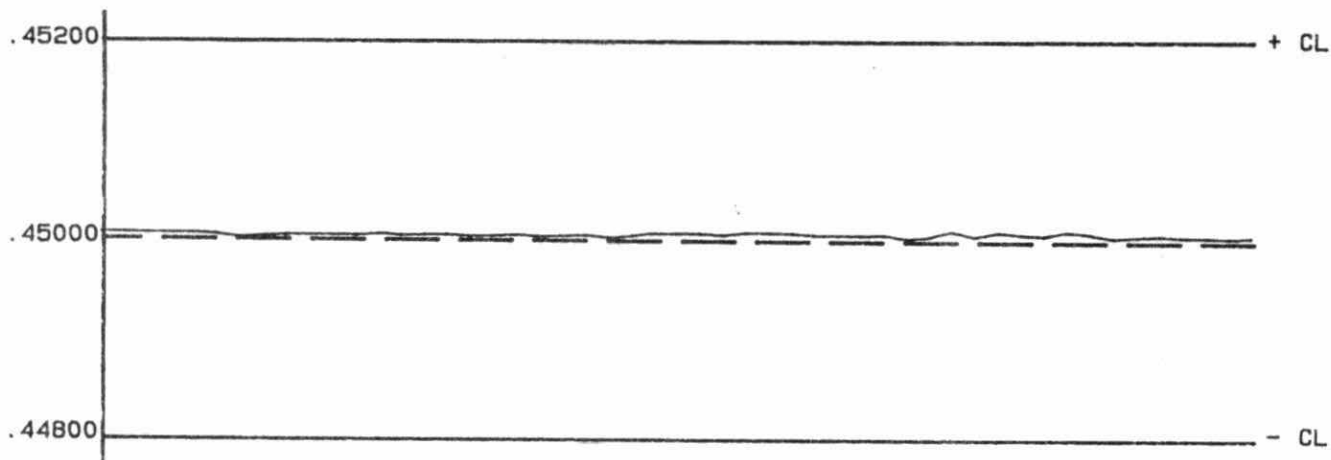
	Number of Data	Data Mean	Standard(1) Deviation
Filter Wash Change :	25	-0.62	0.586

QUALITY CONTROL GRAPHS SOLIDS - PARTICULATE IGNITED (MG/L)

FROM: 02/01/86
TO: 22/12/86

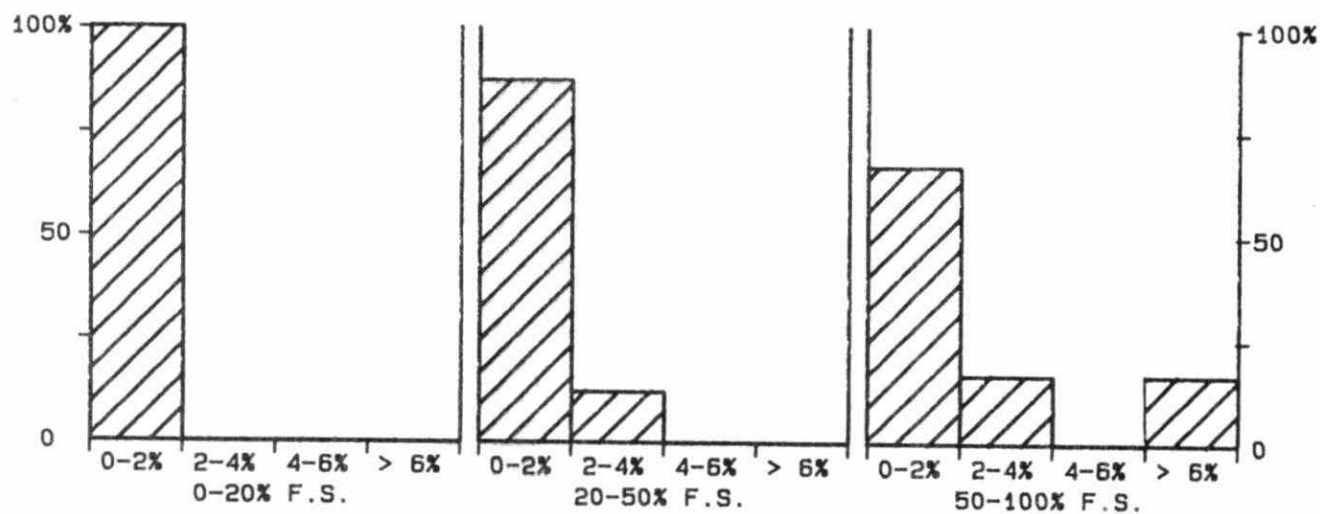


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

SOLIDS - TOTAL IGNITED
QUALITY CONTROL DATA FROM 10/01/86 TO 22/12/86

Lab: Solids and BOD

Analytical Range: - to 30000 mg/L

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	-----	-----	-----	-----
	12	0 - 4000	22.0	1.5
	2	4000 - 8000	30.0	0.4
	2	8000 - 12000	38.3	0.4
	7	12000 - 18000	244.8	1.7
	6	18000 - 30000	141.7	0.6
	29	Overall	137.8	N/A

STANDARD DEVIATION (s.dupl): 22.0

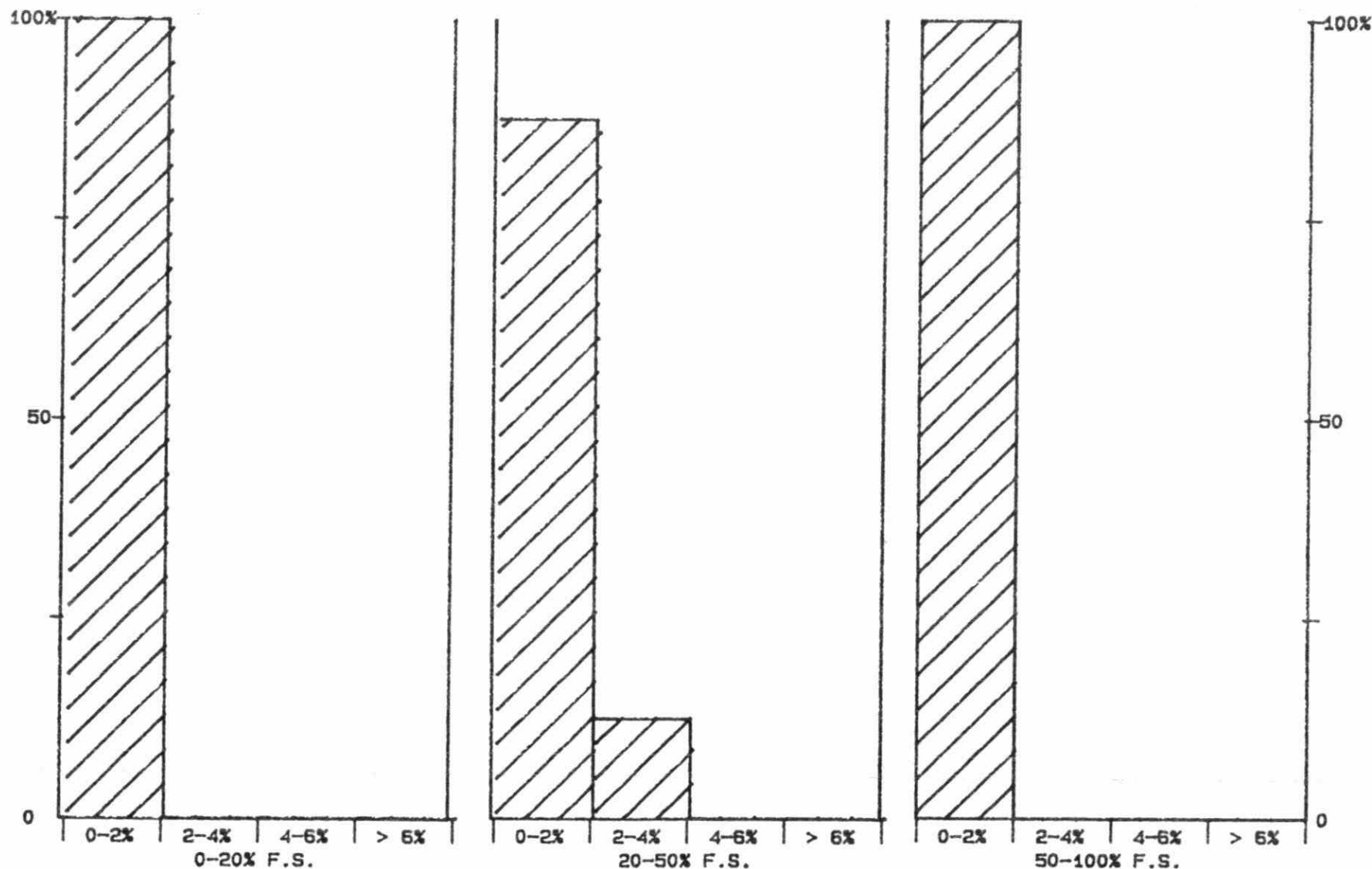
W value: 20

T value: 100

OTHER CHECKS:	Number of Data	Data Mean	Standard(1) Deviation
	-----	-----	-----
Filter Wash Change :	29	-1.82	4.390

QUALITY CONTROL GRAPH SOLIDS - TOTAL IGNITED (MG/L)

FROM: 10/01/86
TO: 22/12/86



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 30000 MG/L

*** SOLIDS - PARTICULATE ***

IDENTIFICATION:

Laboratory	: Rivers and Lakes	Method Introduced:	01/04/74
LIS Test Name Code:	RSP	Units	: mg/L
Work Station Code	: RMTSD	Unit Code	: 064000
Method Code	: 202A16	Supervisor	: P. Campbell
Sample Type/Matrix:	Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required: 150-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (100 to 500 mL) is quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a prewashed and preweighed Whatman 934AH glass fibre filter. The cylinder and then the filter are washed with 30 mL distilled water; the rinse step is repeated. The filter is dried at 103 to 105 C, and stored in a desiccator until cool. After reweighing, the particulate residue or suspended solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance (5-decimal places), drying oven, suction filtration apparatus
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 2 S class weights, eg, QCA
Recovery : LTBL plus 2 standards, eg, R1
Drift : Balance zero is checked frequently
Blank : Filter washed with 50 mL distilled water, result uncorrected.

MODIFICATIONS:

01/03/84 -QC program was expanded to include recovery standards.
01/05/84 -Microcomputer control was introduced.
26/03/86 -TEST TRANSFERRED TO SOLIDS AND BOD FROM RIVERS AND LAKES.

SOLIDS - PARTICULATE
QUALITY CONTROL DATA FROM 02/01/86 TO 24/03/86

Lab: Rivers and Lakes

Analytical Range: 1 to 1000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	33	100.00	99.97	-0.03	0.005
b :	33	20.00	19.90	-0.10	0.007
a+b :	33	120.00	119.87	-0.13	0.010
a-b :	33	80.00	80.07	0.07	0.007

s.d.(AB): Sw(within run): 0.005 S(between runs): 0.006 S/Sw: 1.23

On any given day the calibration is accepted if the values obtained lie within the ranges:

119.81 to 120.19 for A+B
79.88 to 80.12 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	21	50.00	47.92	2.385
r2 :	21	10.00	9.33	1.451

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
20	0.0 - 5.0	0.43	17.2
10	5.0 - 10.0	0.22	2.9
6	10.0 - 25.0	0.81	4.4
9	25.0 - 100.0	4.51	10.0
0	100 - 1000	N/A	N/A
45	Overall	2.1	N/A

STANDARD DEVIATION (s.dupl): 0.43

W value: 0.2

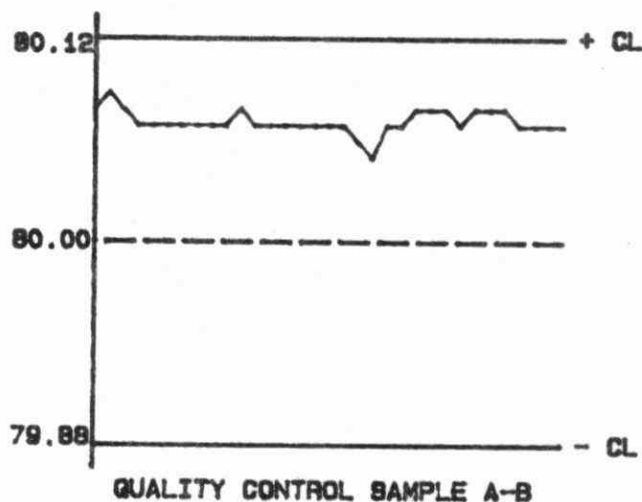
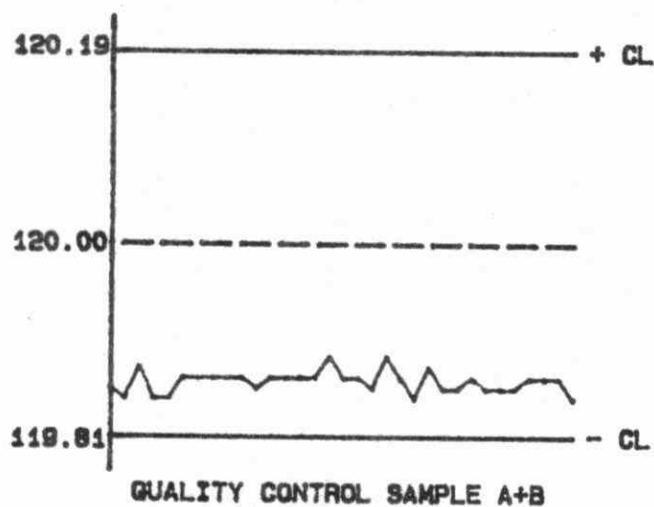
T value: 1

OTHER CHECKS:

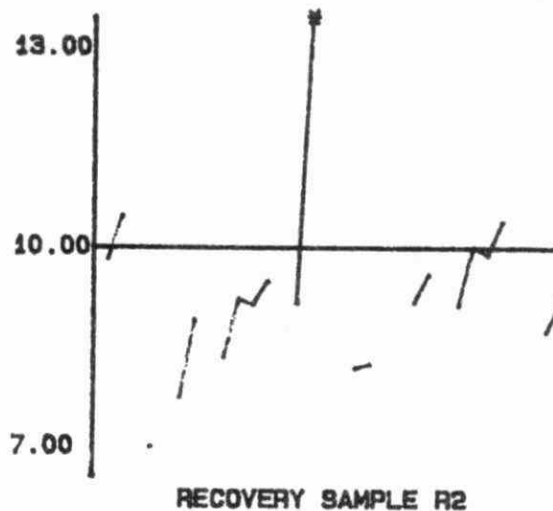
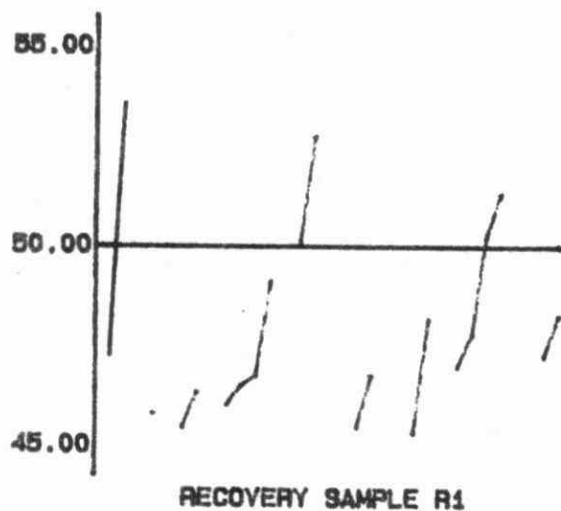
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	19	-0.42	0.420

QUALITY CONTROL GRAPHS SOLIDS - PARTICULATE (MG/L)

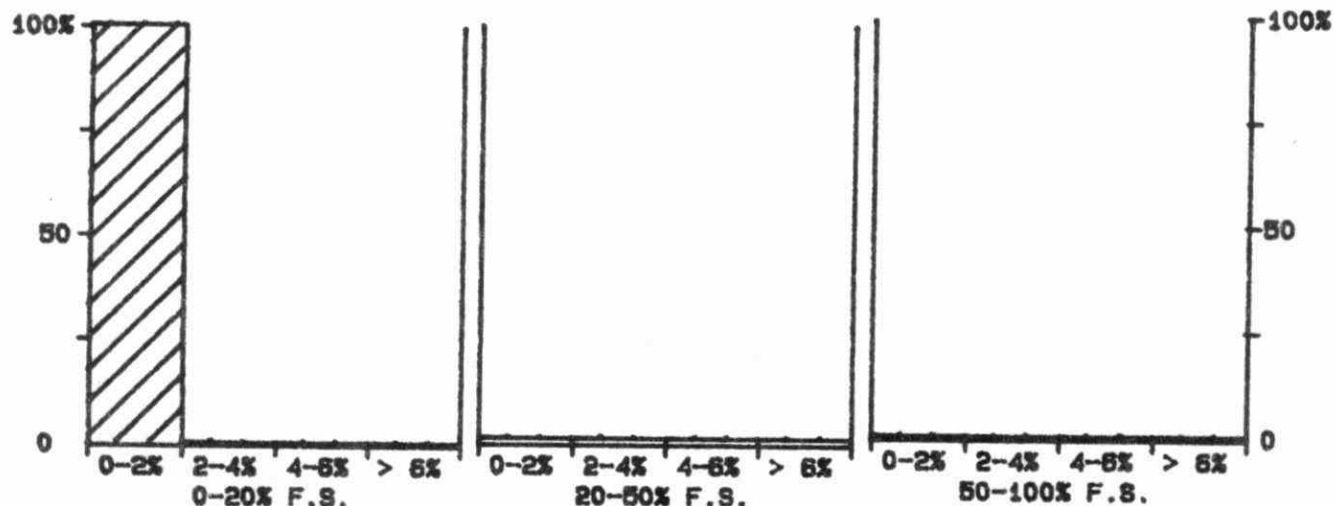
FROM: 02/01/86
TO: 24/03/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 1000 MG/L

*** SOLIDS - PARTICULATE ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced:	Before '61
LIS Test Name Code:	RSP	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064
Method Code	: 206AB5	Supervisor	: P. Campbell
Sample Type/Matrix: Sewage, Industrial Waste, Drinking Waters, Leachate, Effluents			

SAMPLING:

Quantity Required: 5-500 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate sample volume (5 to 500 mL) is quickly poured into a graduated cylinder, and the volume is or pipetted measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The cylinder and then the filter are washed with 50 mL distilled water. The filter is dried at 103 to 105 C, and stored in a desiccator until cool. After reweighing, the particulate residue or suspended solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance(5-decimal places),drying oven, suction filtration apparatus
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Calculated W values: 1 T value: 5

CALIBRATION:

Balance zero

CONTROLS:

Calibration : 2 S class weights, eg, QCA for each balance (results in grams)
Recovery : LTBL plus 2 standards, eg, R1
Drift : Balance zero is checked at least 4 times daily
Blank : Filter rinsed with 50 mL distilled water and corrected using blank correction factor outlined below (expected result is 0.00 mg/L).

MODIFICATIONS:

01/07/81 -Current microcomputer control system was introduced.
01/03/83 -QC program was expanded to include recovery standards.
01/05/83 -Prerinsing of filters was discontinued. Instead, 5 filters from each box of 100 are weighed before and after rinsing to correct results for filters used with samples.
01/07/83 -New glass and acrylic filter holders (Whatman 90 mm) replaced Buchner funnels. Size and position of pores in the two types of holders is similar, but the filtration area is smaller and the seal at the filter edge is superior with the new holder.
26/03/86 -47 mm diameter filtration units used for all analyses. Aliquots used for mixed liquor and aeration samples were sometimes as low as 5 mL (ie. factor 200) but precision should be ignored at low end of analytical range.

SOLIDS - PARTICULATE
QUALITY CONTROL DATA FROM 02/01/86 TO 31/12/86

Lab: Solids and BOD

Analytical Range: 5 to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	83	0.50002	0.50000	-0.00002	0.000021
b :	83	0.05002	0.05001	-0.00001	0.000019
a+b :	83	0.55004	0.55000	-0.00004	0.000035
a-b :	83	0.45000	0.44999	-0.00001	0.000020

s.d.(AB): Sw(within run):0.000014 S(between runs):0.000020 S/Sw: 1.42

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.5470 to 0.5530 for A+B

0.4479 to 0.4520 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn, Measured	Standard(1) Deviation
r1 :	49	187	181	2.0
r2 :	54	47.2	46.1	1.45

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
92	0.0 - 25.0	1.16	12.9
27	25.0 - 50.0	2.44	6.8
56	50.0 - 150.0	4.89	5.9
8	150 - 3000	7.4	1.7
183	Overall	3.4	N/A

STANDARD DEVIATION (s.dupl): 1.16

W value: 1

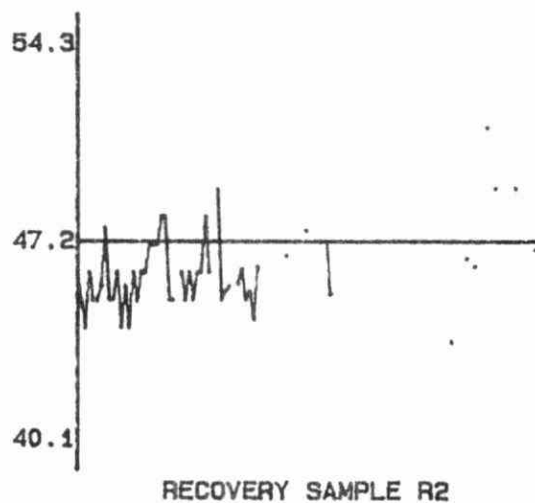
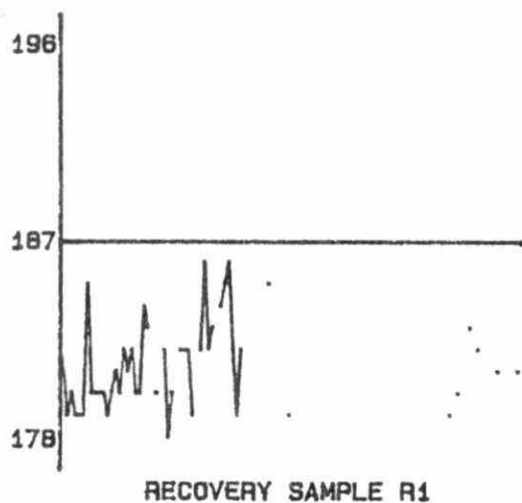
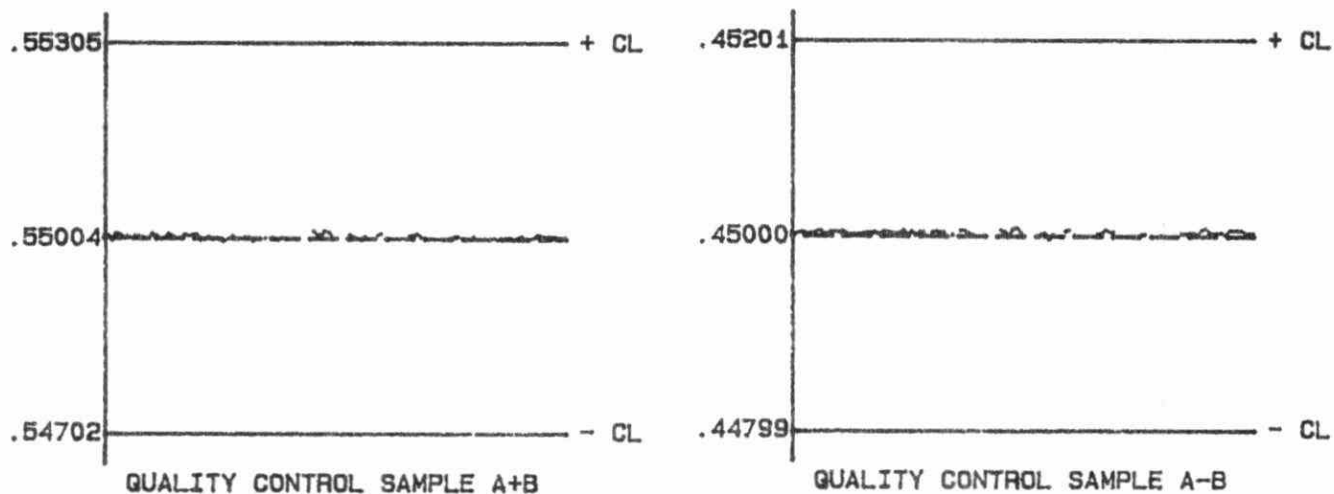
T value: 5

OTHER CHECKS:

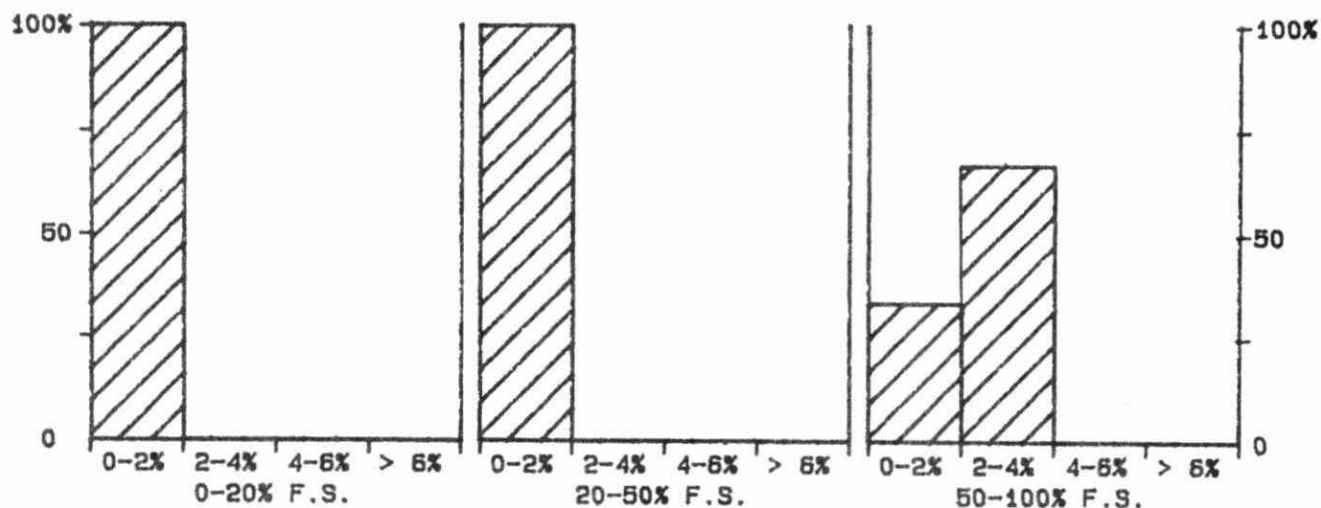
	Number of Data	Data Mean	Standard(1) Deviation
Filter Wash Change :	106	0.12	0.446

QUALITY CONTROL GRAPHS SOLIDS - PARTICULATE (MG/L)

FROM: 02/01/86
TO: 31/12/86



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 3000 MG/L

*** SOLIDS- TOTAL ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced:	Before '61
LIS Test Name Code:	RST	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: P. Campbell
Sample Type/Matrix:	Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents, Sludge		

SAMPLING:

Quantity Required: 75 mL to 125 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

A 50.0 or 100 mL aliquot of sample is pipetted into a preweighed teflon dish, dried at 103 to 105 C, and stored in a desiccator for at least 24 hours. After reweighing the total residue or solids content is calculated by difference. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

-Balance(4/5-decimal places),drying oven, teflon dishes
-Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 10 T value: 50

CALIBRATION:

Balance zero and 1 built-in calibration weight

CONTROLS:

Calibration : 2 S class weights, eg, GCA (results in grams)
Recovery : BL plus 2 standards, eg, R1
Drift : Balance zero is checked at least 4 times daily

MODIFICATIONS:

15/01/82 -Microcomputer control was introduced.
01/07/85 -Teflon dishes replaced ceramic dishes and aliquot volume was increased to 100 ml where the expected result was below 1000 mg/L.
01/12/86 -Correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in calculation.

SOLIDS - TOTAL
QUALITY CONTROL DATA FROM 02/01/86 TO 22/12/86

Lab: Solids and BOD

Analytical Range: 50 to 60000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	52	50.0004	50.0004	-0.0000	0.00008
b :	52	30.0001	30.0000	-0.0001	0.00008
a+b :	52	80.0005	80.0004	-0.0001	0.00013
a-b :	52	20.0003	20.0003	0.0000	0.00010

s.d.(AB): SW(within run): 0.00007 S(between runs): 0.00008 S/SW: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.999 to 80.002 for A+B

19.999 to 20.001 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	30	20000	20116	63.4
r2 :	29	2000	2006	9.4

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
19	0 - 2000	13.2	2.2
5	2000 - 10000	47.1	1.0
7	10000 - 20000	60.5	0.4
7	20000 - 40000	211.6	0.7
0	40000 - 60000	N/A	N/A
38	Overall	96.4	N/A

STANDARD DEVIATION (s.dup1): 13.2

W value: 10

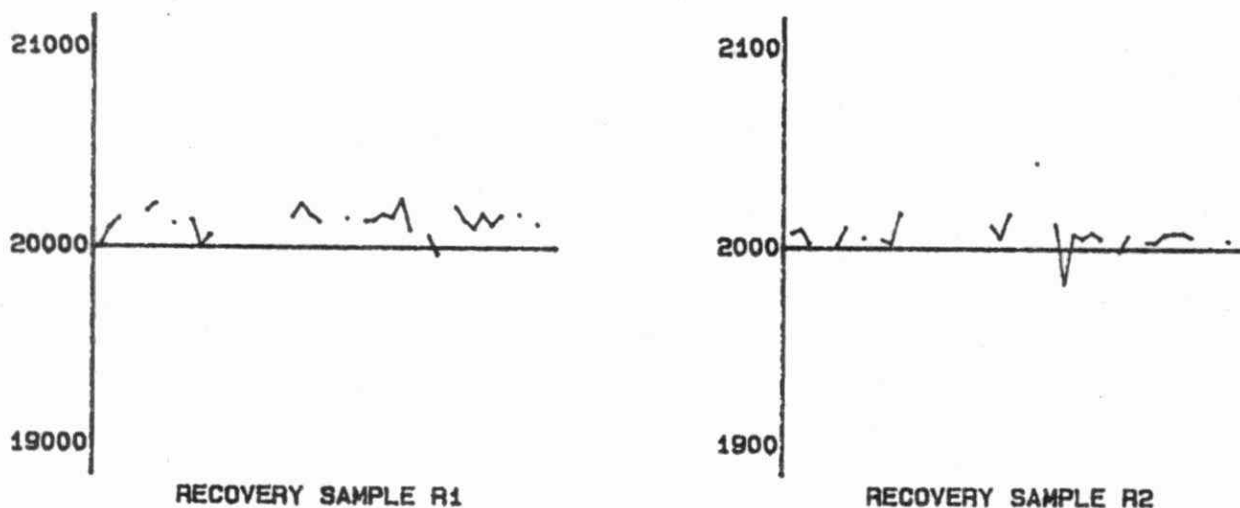
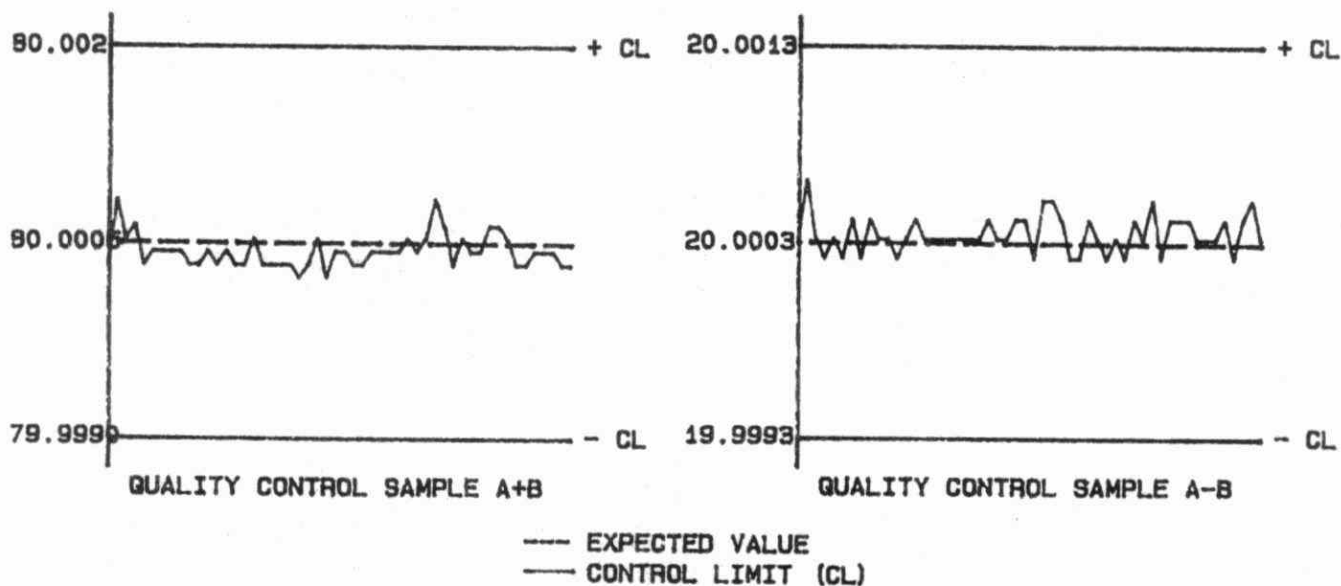
T value: 50

OTHER CHECKS:

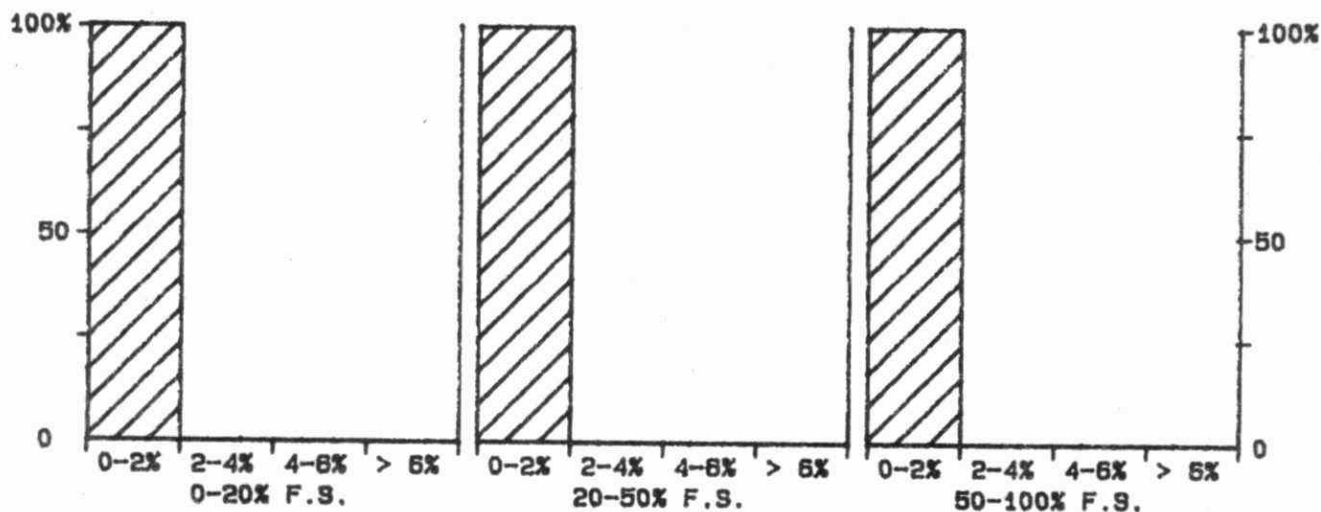
	Number of Data	Data Mean	Standard(1) Deviation
Filter Wash Change :	24	-0.52	2.760

QUALITY CONTROL GRAPHS SOLIDS - TOTAL (MG/L)

FROM: 02/01/86
TO: 22/12/86



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 60000 MG/L

*** SULPHATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/07/80
LIS Test Name Code: SS04FR,SS04NF Units : ug/Filter as SO4
Work Station Code : PRSEQ Unit Code : 361941
Method Code : 004A10 Supervisor : F. Tomassini
Sample Type/Matrix: Teflon and nylon filters from sequential filter packs and
nylon filters from LoVol filter packs.

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bag

SAMPLE PREPARATION:

Filters are extracted with 25 mL of DDW (teflon) or 25 mL of .03N NaOH (nylon)
in polystyrene tubes with ultrasonic treatment followed by a 24 hour rest
period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample extract by automated
suppressed ion chromatography using an eluent mixture of 0.003M sodium
bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples
are spiked with Na2CO3/NaHCO3 to match the eluent strength and maintain
background conductivity. The concentration of sulphate in mg/L as SO4 is
determined by comparison of the sample scan to a series of standard scans.
Results are converted to ug/filter as SO4.
Full scale conductivity : 30 uS/cm.
Nitrate and chloride are determined simultaneously.

INSTRUMENTATION:

-Ultrasonic bath/ polystyrene tubes
-Automated modular continuous flow ion chromatographic system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1.25** T value: 6.25

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified
for analysis of teflon and nylon filter extracts by developing the above filter
extraction procedure
10/03/84 -Microcomputer for automated sampling and timing was introduced. At
that time automated spiking of samples with Na2CO3/NaHCO3 was introduced.
10/05/85 -Microcomputer used for data reduction.
-Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one
filter because duplicate filters are not received.

SULPHATE
QUALITY CONTROL DATA FROM 03/01/86 TO 29/12/86

Lab: Ion Chromatography

Analytical Range: 6.25 to 250 ug/Filter as SO4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard (1) Deviation
a :	162	200	201	1	2.0
b :	162	50	50	0	1.4
a+b :	162	250	251	1	2.5
a-b :	162	150	151	1	2.4

s.d.(AB): Sw(within run): 1.7 S(between runs): 1.7 S/Sw: 1.02

On any given day the calibration is accepted if the values obtained lie within the ranges:

235 to 265 for A+B
 140 to 160 for A-B

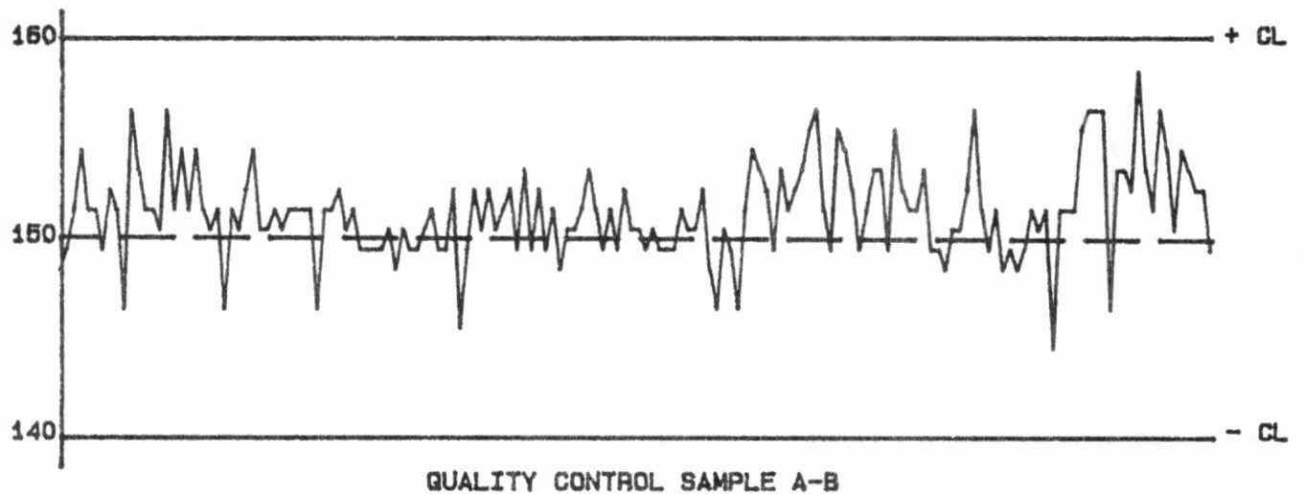
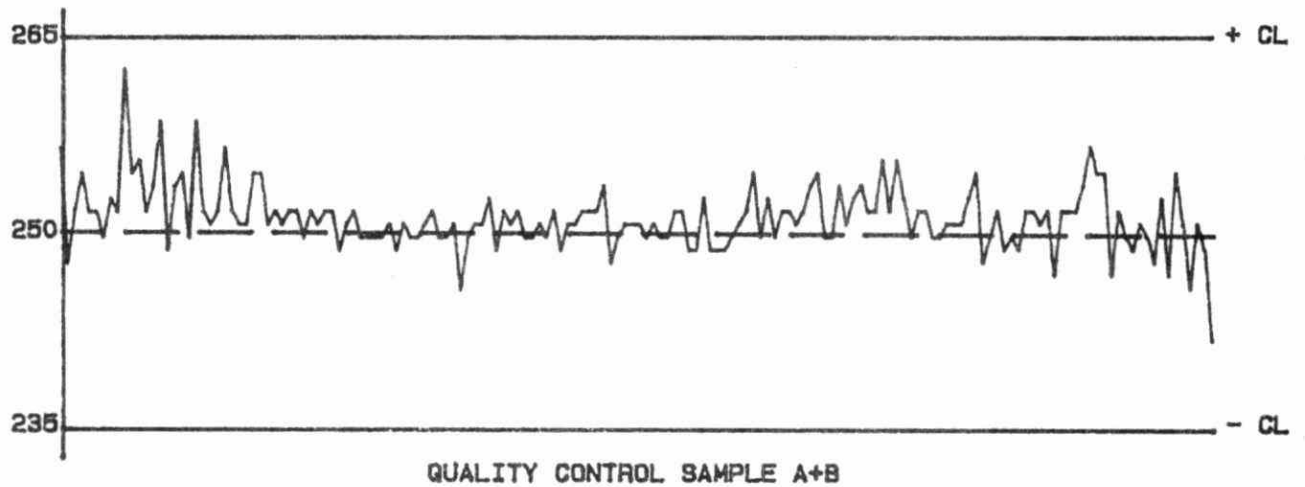
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
179	0 - 25	1.5	14.3
48	25 - 50	2.1	5.6
52	50 - 125	2.8	3.6
21	125 - 250	3.4	1.9
300	Overall	2.0	N/A

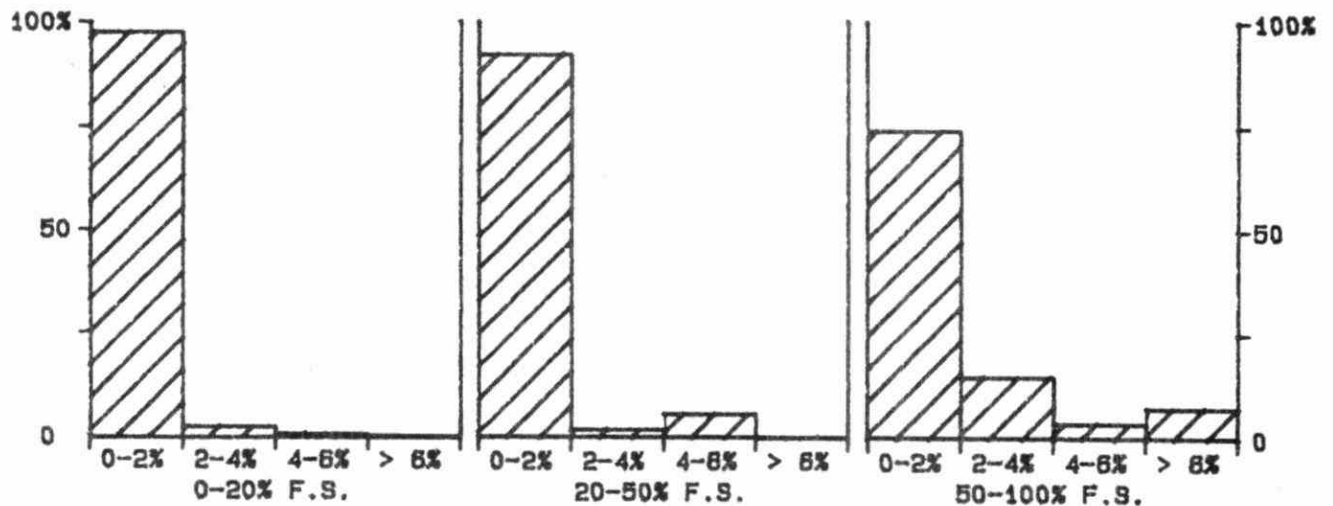
STANDARD DEVIATION (s.dupl): 1.5 W value: 1.25 T value: 6.25

QUALITY CONTROL GRAPHS SULPHATE (UG/FILTER AS S04)

FROM: 03/01/86
TO: 29/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 250 UG/FILTER AS S04

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Domestic Water	Method Introduced:	01/04/82
LIS Test Name Code:	SS04UR	Units	: mg/L as SO ₄
Work Station Code	: WS04	Unit Code	: 064841
Method Code	: 003AC1	Supervisor	: M. Rawlings
Sample Type/Matrix: Domestic Waters, Leachates, Effluents			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sulphate is pumped through an ion exchange column to suppress cationic interferences, and then the sulphate reacts with barium methyl-thymol blue to produce barium sulphate and methyl-thymol blue (MTB). The absorbance of MTB provides a measurement of the sulphate concentration.
Approximate absorbance: 1.0 at the 100 mg/L level.

INSTRUMENTATION:

Basic modular continuous flow system plus the modules: 37 C heating bath (7.7 mL delay), cationic exchange column. Colourimetric measurement is through a 5.0 cm light path at 460 nm.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: N/A T value: N/A

CALIBRATION:

BL plus 1 standard in duplicate

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : BL plus 2 standards
Interference: BL spiked with 50 mg/L magnesium SO₄ and 200 mg/L calcium confirms efficiency of cation removal.

MODIFICATIONS:

01/10/81 -A carbon dioxide trap was installed on the sodium hydroxide reagent.
01/10/84 -A heating bath module (37 C) was installed preceeding the colourimeter.

01/04/86 -THIS PROCEDURE WAS DISCONTINUED AND SAMPLES ASSIGNED TO RMDSO₄.

SULPHATE
QUALITY CONTROL DATA FROM 02/01/86 TO 28/04/86

Lab: Domestic Water

Analytical Range: N/A to 100.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	26	60.0	60.1	0.1	0.65
b :	26	15.0	15.1	0.1	0.52
a+b :	26	75.0	75.2	0.2	0.89
a-b :	26	45.0	45.0	0.0	0.77
c :	27	15.00	15.09	0.09	0.259
d :	27	5.00	4.98	-0.02	0.181
c+d :	27	20.00	20.07	0.07	0.271
c-d :	27	10.00	10.11	0.11	0.355

s.d.(AB): SW(within run): 0.54 S(between runs): 0.59 S/Sw: 1.08
s.d.(CD): SW(within run): 0.251 S(between runs): 0.223 S/Sw: 0.89

On any given day the calibration is accepted if the values obtained lie within the ranges:

70.5 to 79.5 for A+B
42.0 to 48.0 for A-B
19.10 to 20.90 for C+D
9.40 to 10.60 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	2	0.00 - 2.00	0.065	7.0
	1	2.00 - 5.00	N/A	N/A
	61	5.00 - 10.00	0.208	2.7
	12	10.0 - 20.0	0.32	2.1
	13	20.0 - 100.0	0.53	1.2
	89	Overall	0.29	N/A

STANDARD DEVIATION (s.dupl): N/A

W value: N/A

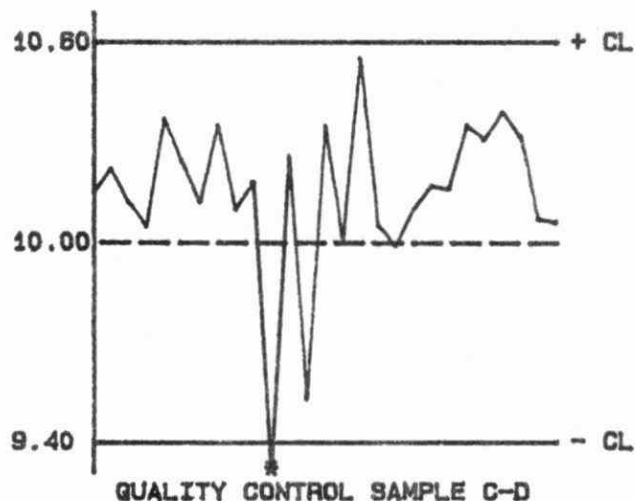
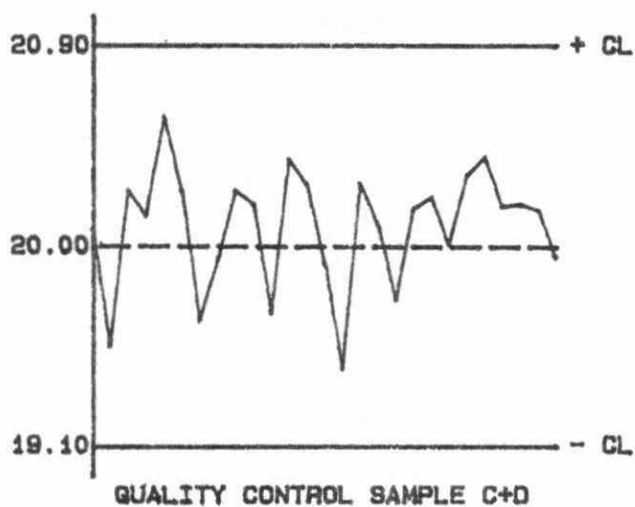
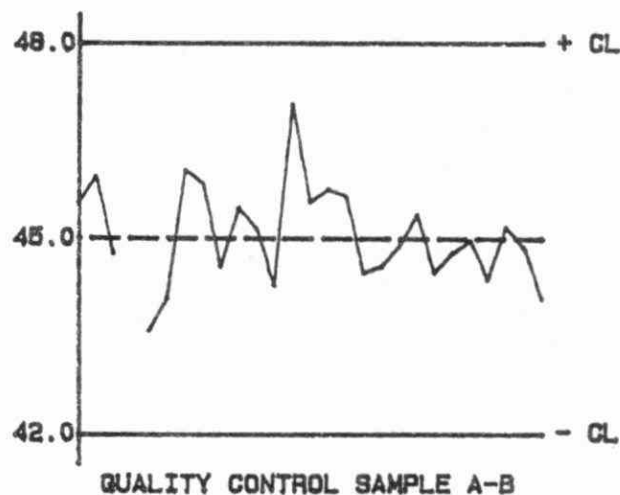
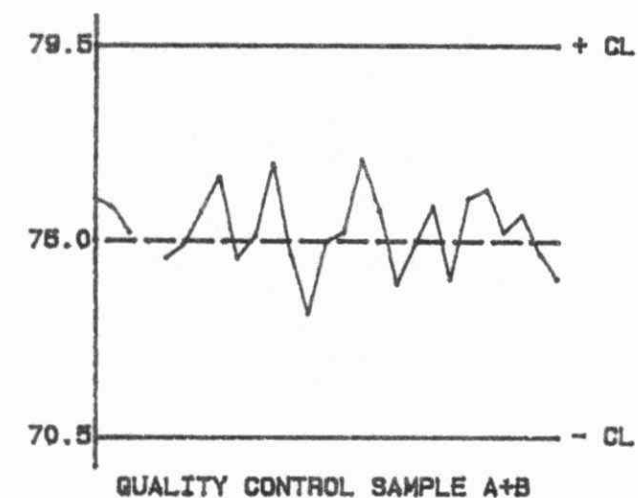
T value: N/A

OTHER CHECKS:

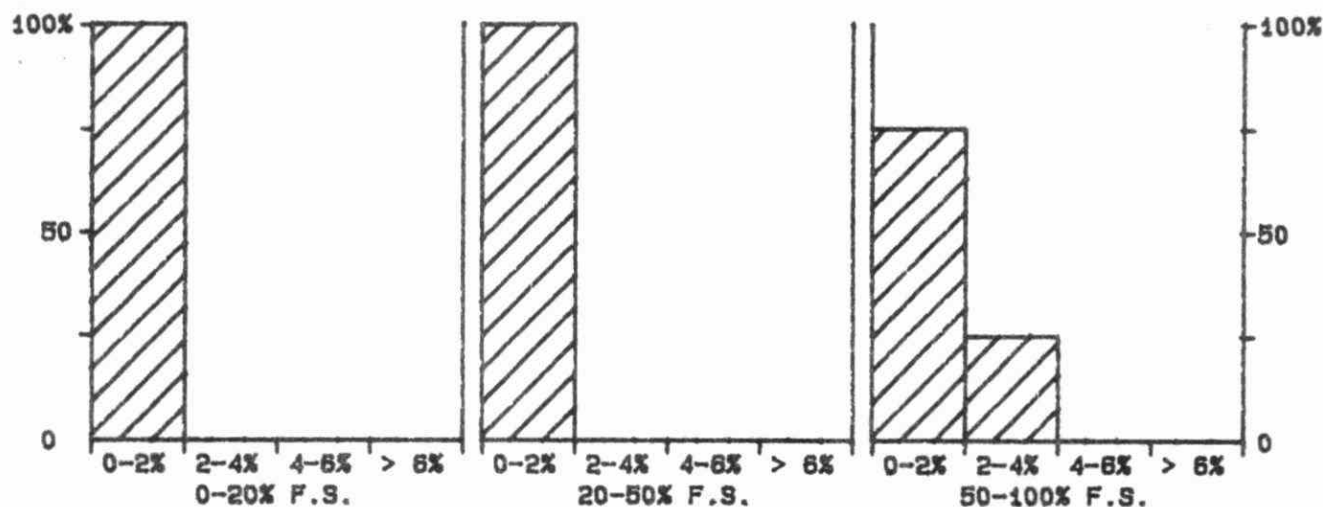
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	27	0.00	0.000

QUALITY CONTROL GRAPHS SULPHATE (MG/L AS SO₄)

FROM: 02/01/86
TO: 28/04/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 MG/L AS SO₄

*** SULPHATE - PRECIPITATION ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/04/78
LIS Test Name Code: SS04UR Units : mg/L as SO4
Work Station Code : PRIC1 Unit Code : 064941
Method Code : 003A10 Supervisor : F. Tomassini
Sample Type/Matrix: Precipitation, Throughfall, Stemflow.

SAMPLING:

Quantity Required: 15 mL
Container : Polystyrene

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na2CO3/NaHCO3 to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO4 is determined by comparison of the sample scan to a series of standard scans.
Full scale conductivity : 10 uS/cm.
Nitrate and chloride are determined simultaneously.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus microcomputer for automated sample introduction, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.05** T value: 0.25

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples

Modifications:

01/04/86 -Varian Spectrex Model 4270 was introduced to convert calibration data to a quadratic equation and calculate preliminary sample concentrations; the latter, however, still have to be manually corrected for in-run sensitivity changes.

SULPHATE
QUALITY CONTROL DATA FROM 07/01/86 TO 31/12/86

Lab: Ion Chromatography

Analytical Range: 0.25 to 10.00 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	143	8.00	8.02	0.02	0.050
b :	143	2.00	2.01	0.01	0.040
a+b :	143	10.00	10.03	0.03	0.070
a-b :	143	6.00	6.02	0.02	0.057

s.d.(AB): Sw(within run): 0.040 S(between runs): 0.045 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

8.55 to 10.45 for A+B
5.70 to 6.30 for A-B

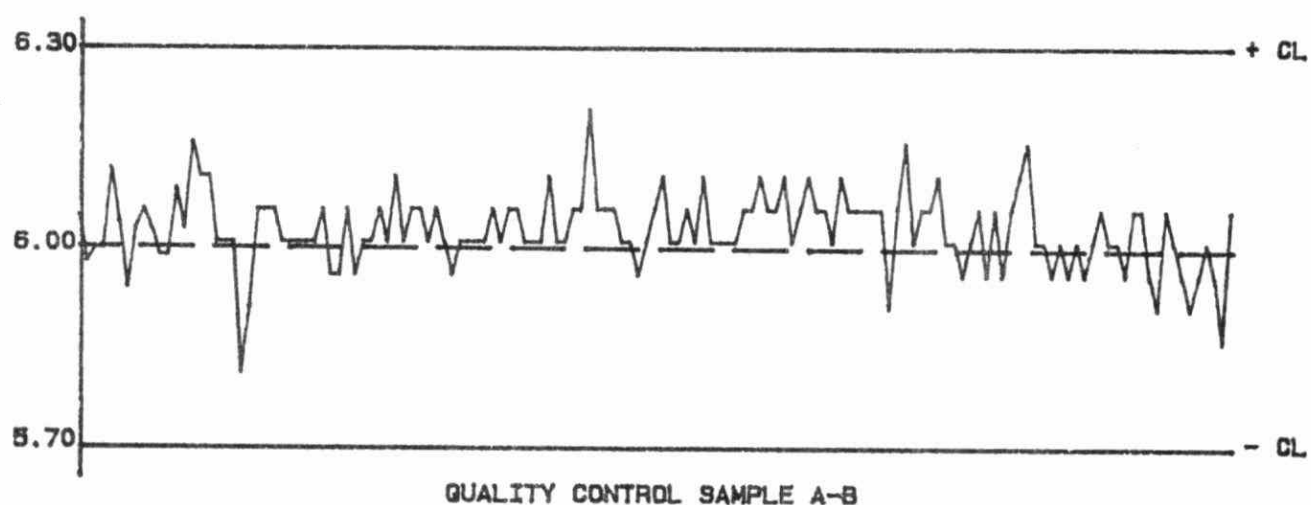
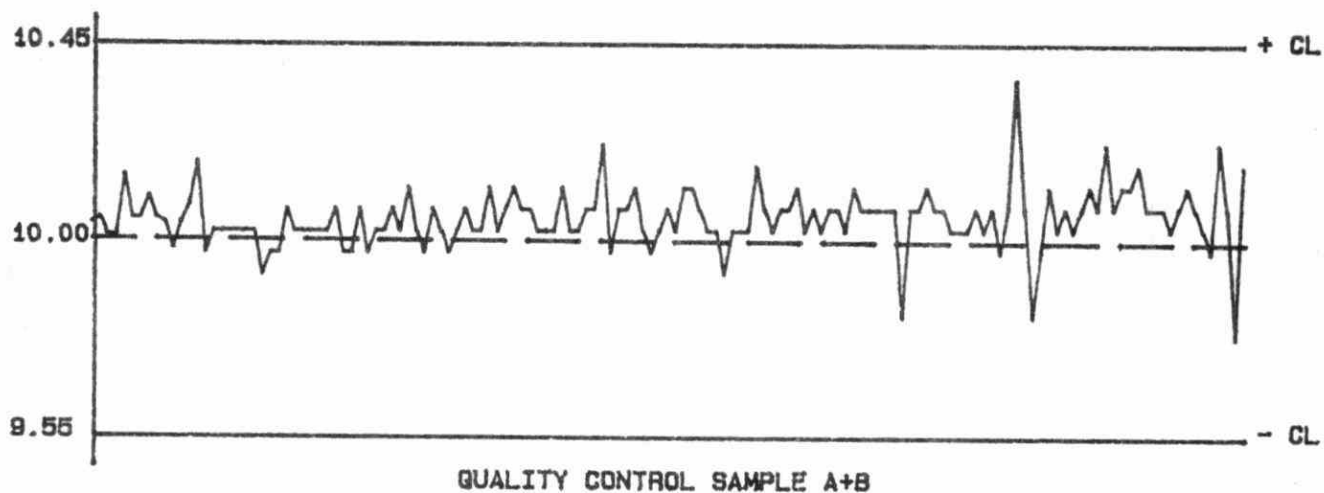
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
75	0.00 - 1.00	0.034	8.8
52	1.00 - 2.00	0.045	2.8
112	2.00 - 5.00	0.053	1.6
25	5.00 - 10.00	0.088	1.2
264	Overall	0.051	N/A

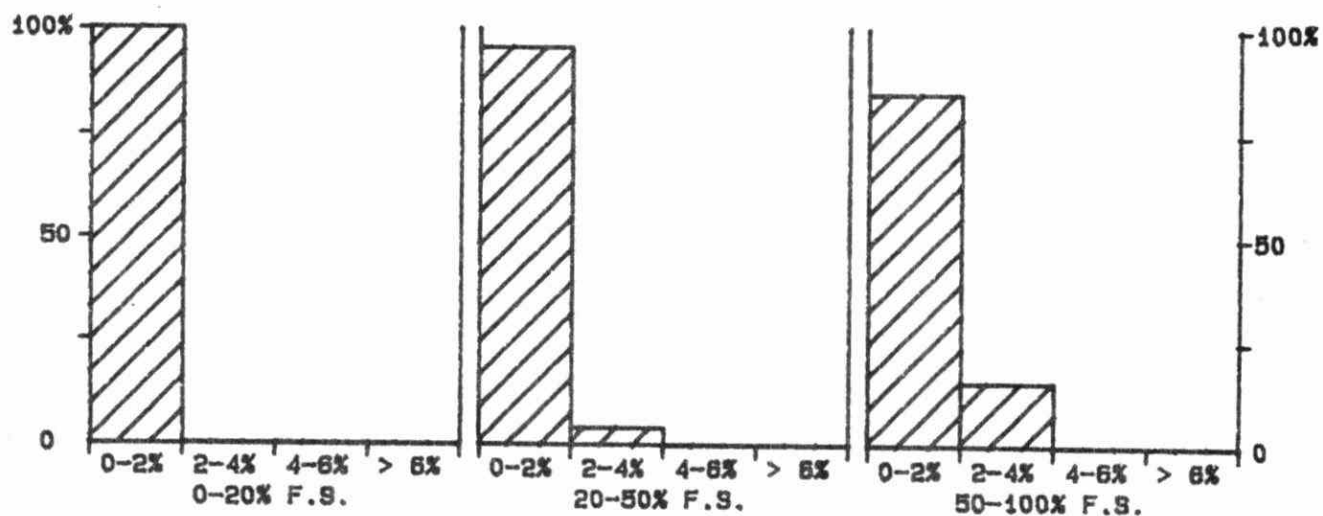
STANDARD DEVIATION (s.dupl): 0.034 W value: 0.05 T value: 0.25

QUALITY CONTROL GRAPHS SULPHATE (MG/L AS SO₄)

FROM: 07/01/86
TO: 31/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 MG/L AS SO₄

*** SULPHATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/07/80
LIS Test Name Code: SS04UR Units : ug/Filter as SO4
Work Station Code : PRL0V Unit Code : 361841
Method Code : 004AIC Supervisor : F. Tomassini
Sample Type/Matrix: W40 filters from LoVol filter packs.

SAMPLING:

Quantity Required: 1 filter
Container : Polyethylene bags

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample extract by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na2CO3/NaHCO3 to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO4 is determined by comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO4.
Full scale conductivity : 30 uS/cm.
N.B. Nitrate and chloride are determined simultaneously.

INSTRUMENTATION:

-Ultrasonic bath; polyethylene tubes
-Automated modular continuous flow ion chromatographic system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2.5** T value: 12.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
Drift : 1 standard every 10 samples

MODIFICATIONS:

01/08/81 -Ion chromatographic procedure for precipitation samples was modified for analysis of LoVol W40 filter extracts by developing the above filter extraction procedure.
10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na2CO3/NaHCO3 was introduced.
10/05/85 -Microcomputer used for data reduction.
10/05/85 -Three additional calibration standards were set up.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.
No data summary available for period not covered in performance report.

SULPHATE
QUALITY CONTROL DATA FROM 14/01/86 TO 11/12/86

Lab: Ion Chromatography

Analytical Range: 12.5 to 500 ug/Filter as SO4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	25	400	402	2	5.0
b :	25	100	99	-1	2.8
a+b :	25	500	501	1	5.7
a-b :	25	300	303	3	5.8

s.d.(AB): Sw(within run): 4.1 S(between runs): 4.1 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

470 to 530 for A+B
 280 to 320 for A-B

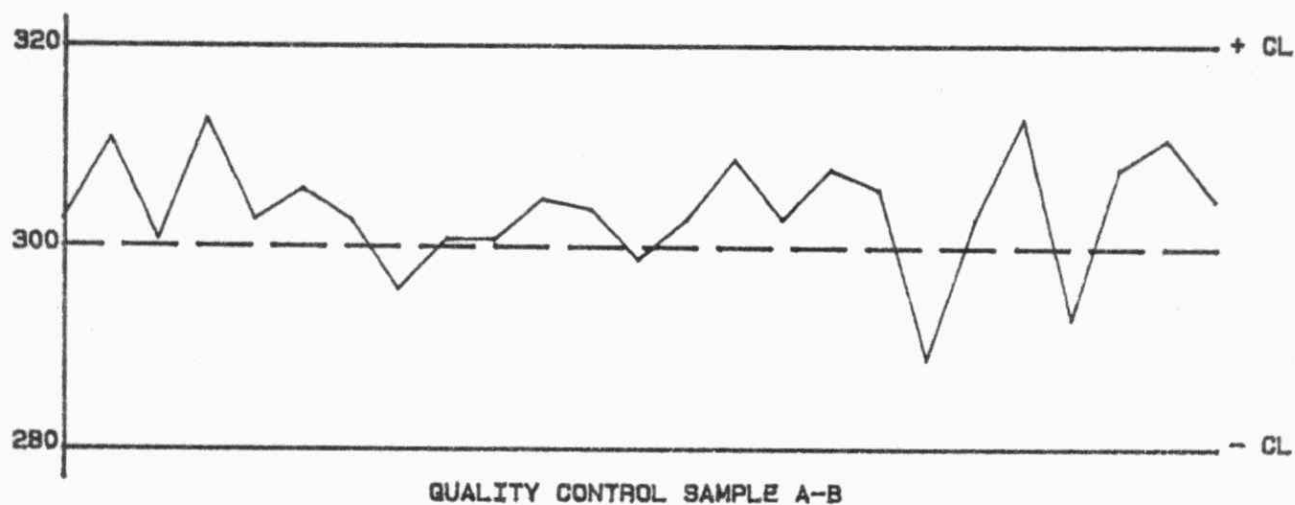
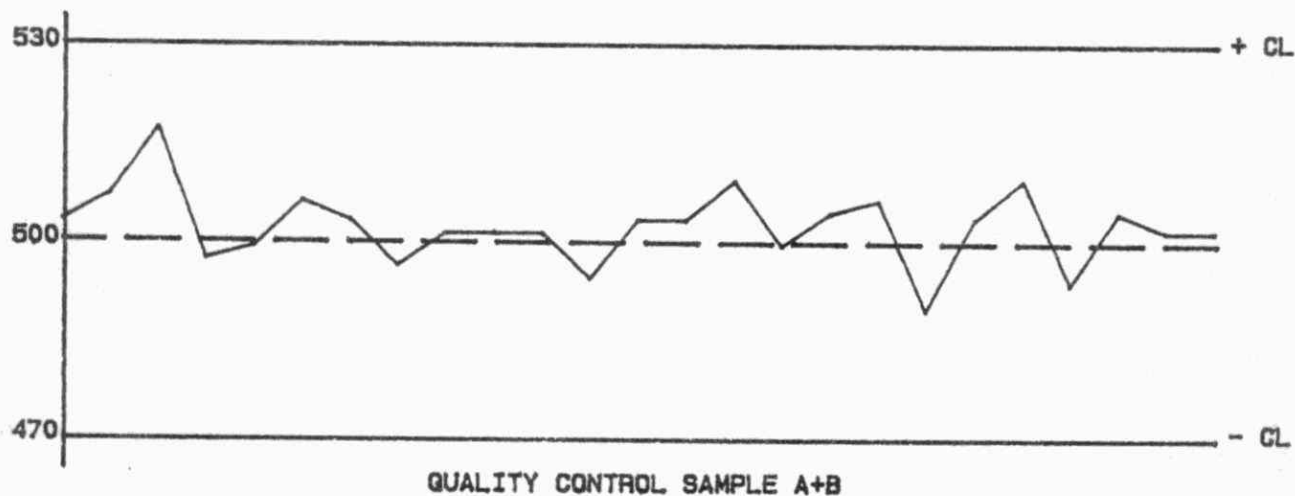
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0 - 50	2.5	15.8
4	50 - 100	2.6	3.2
1	100 - 250	N/A	N/A
1	250 - 500	N/A	N/A
34	Overall	2.6	N/A

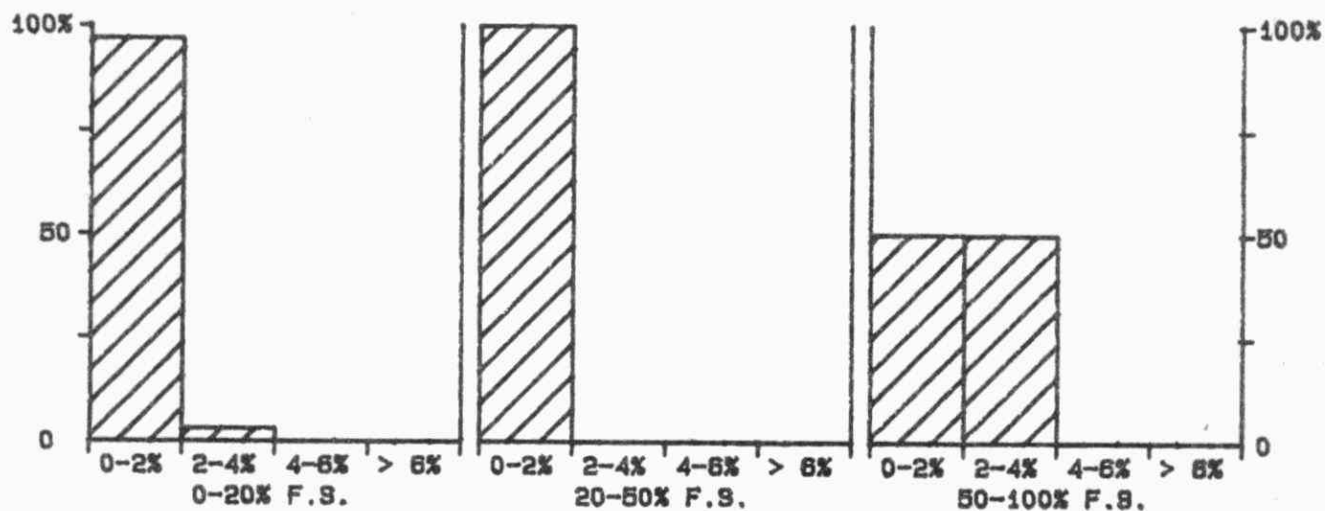
STANDARD DEVIATION (s.dupl): 2.5 W value: 2.5 T value: 12.5

QUALITY CONTROL GRAPHS SULPHATE (UG/FILTER AS S04)

FROM: 14/01/86
TO: 11/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 500 UG/FILTER AS S04

*** SULPHATE ***

IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/04/82
LIS Test Name Code: SS04UR Units : mg/L as SO₄
Work Station Code : RMDS04 Unit Code : 064941
Method Code : 003A10 Supervisor : F. Tomassini
Sample Type/Matrix: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO₄ is determined by comparison of the sample scan to a series of standard scans.

Full scale conductivity: 100 uS/cm.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.5, 0.1 T value: 2.5, 0.5
NOTE: W and T values listed are for 200 and 20 mg/L instruments respectively.

CALIBRATION:

BL plus 13 standards

CONTROLS:

Calibration : LTBL plus 3 standards, eg, QCA
Drift : 2 standards

MODIFICATIONS:

01/04/82 -The sulphate procedure that was introduced differed slightly from Method B in HAMES: (1) full scale values for the analytical ranges were 20.0 and 50.0 mg/L, and (2) samples were not spiked with concentrated eluent. The latter was not necessary because only sulphate was measured and spiking is required for chloride analysis.

01/01/84 -Packed suppressor column was replaced by a fibre suppressor (walls of fibre are ion-exchange media). Full scale for high analytical was increased from 50.0 to 100 mg/L as SO₄; QC standards were adjusted accordingly. Analytical rate was doubled.

17/10/85 -Increase number of standards to 16 to ensure proper calibration at low end of analytical range.

24/04/86 -APIOS Dorset samples assigned to second system with full scale 20 mg/L as SO₄.

28/04/86 -Full scale increased from 100 to 200 mg/l as SO₄; QC standards were adjusted accordingly.

SULPHATE
QUALITY CONTROL DATA FROM 29/04/86 TO 31/12/86

Lab: Ion Chromatography

Analytical Range: 2.5 to 200.0 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	67	150.0	149.4	-0.6	1.66
b :	67	60.0	60.4	0.4	2.13
a+b :	67	210.0	209.7	-0.3	2.82
a-b :	67	90.0	89.0	-1.0	2.57
c :	67	60.00	60.47	0.47	0.954
d :	66	15.00	14.75	-0.25	0.719
c+d :	66	75.00	75.18	0.18	1.214
c-d :	66	45.00	45.67	0.67	1.062

s.d.(AB): Sw(within run): 1.82 S(between runs): 1.91 S/Sw: 1.05
s.d.(CD): Sw(within run): 0.751 S(between runs): 0.845 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

201.0 to 219.0 for A+B
84.0 to 96.0 for A-B
71.40 to 78.60 for C+D
42.60 to 47.40 for C-D

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	24	0.00 - 10.00	0.744	13.7
	29	10.00 - 20.00	1.276	7.9
	71	20.00 - 50.00	1.009	3.3
	30	50.0 - 100.0	1.94	2.9
	15	100.0 - 200.0	2.44	1.6
	169	Overall	1.41	N/A

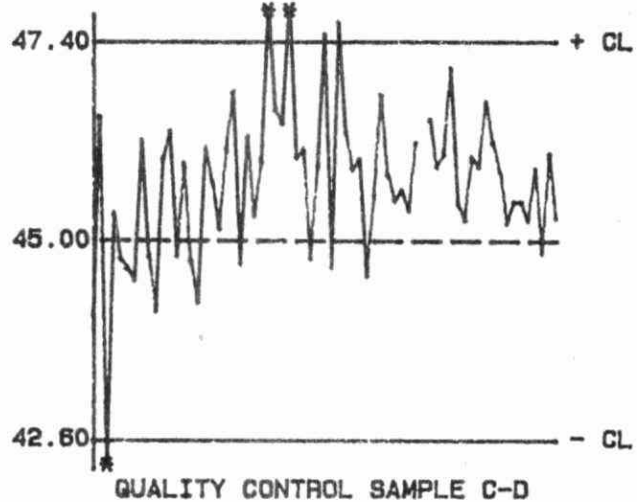
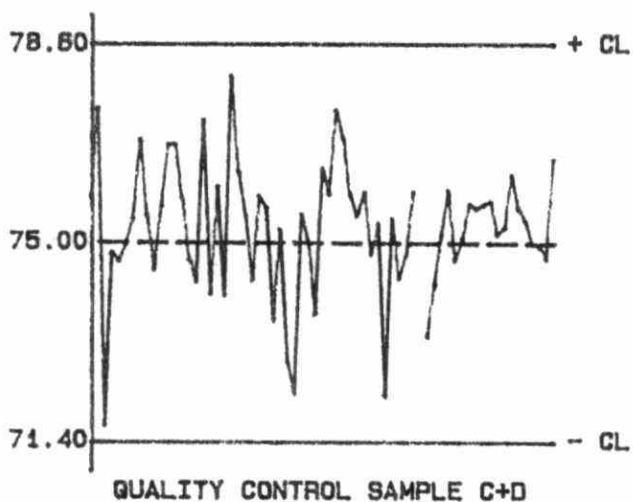
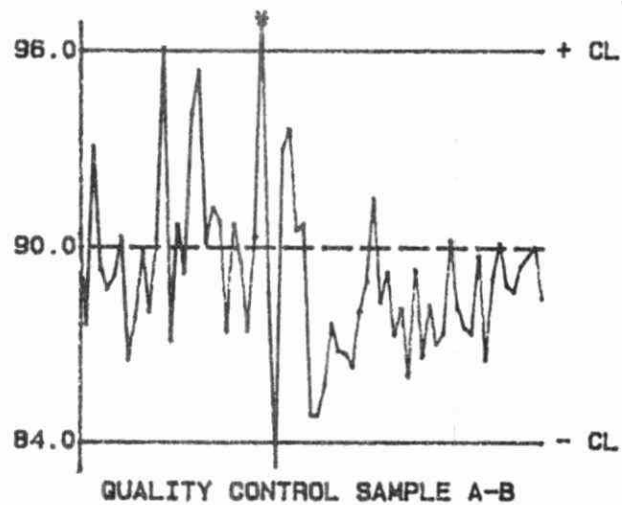
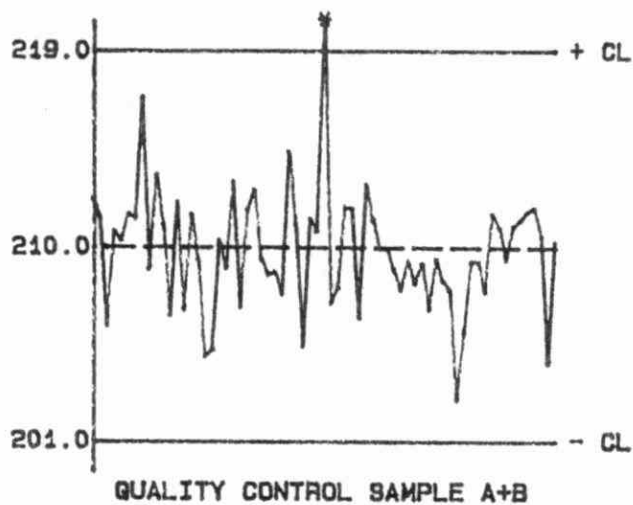
STANDARD DEVIATION (s.dup1): 0.744 W value: 0.5 T value: 2.5

OTHER CHECKS:

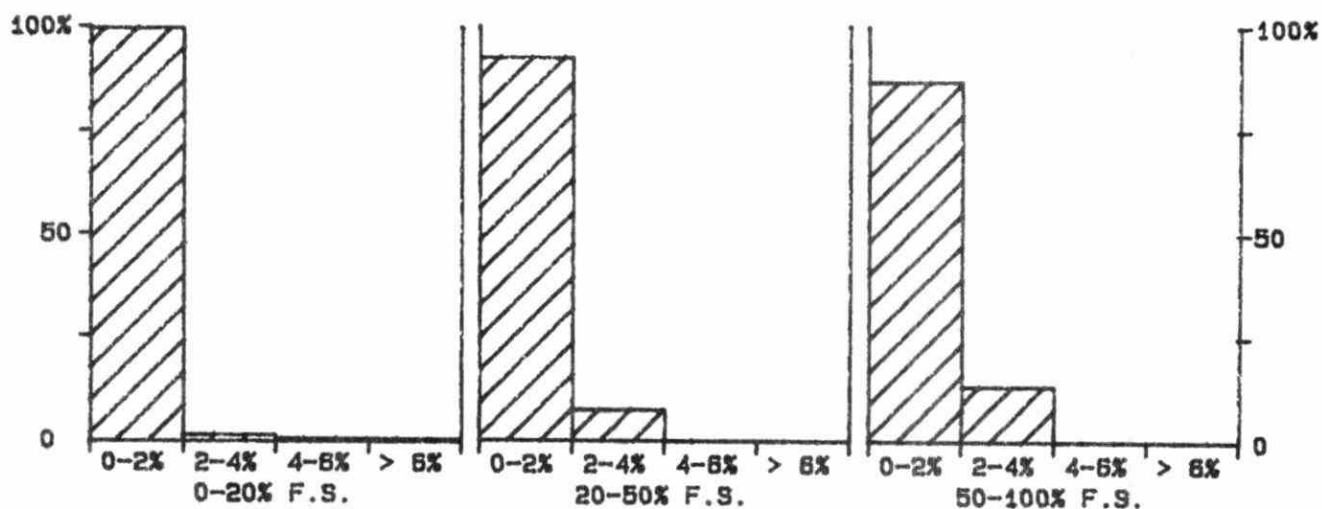
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	67	0.00	0.000

QUALITY CONTROL GRAPHS SULPHATE (MG/L AS SO₄)

FROM: 29/04/86
TO: 31/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 MG/L AS SO₄

SULPHATE
QUALITY CONTROL DATA FROM 24/04/86 TO 24/12/86

Lab: Ion Chromatography

Analytical Range: 0.5 to 20.00 mg/L as SO₄

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	77	15.00	15.01	0.01	0.210
b :	76	2.00	1.97	-0.03	0.234
a+b :	76	17.00	16.98	-0.02	0.330
a-b :	76	13.00	13.03	0.03	0.299

s.d.(AB): Sw(within run): 0.211 S(between runs): 0.222 S/Sw: 1.05

On any given day the calibration is accepted if the values obtained lie within the ranges:

16.10 to 17.90 for A+B
 12.40 to 13.60 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0.00 - 2.00	0.123	24.2
40	2.00 - 5.00	0.327	9.2
117	5.00 - 10.00	0.296	4.2
19	10.00 - 20.00	0.863	6.2
188	Overall	0.392	N/A

STANDARD DEVIATION (s.dup1): 0.123

W value: 0.1

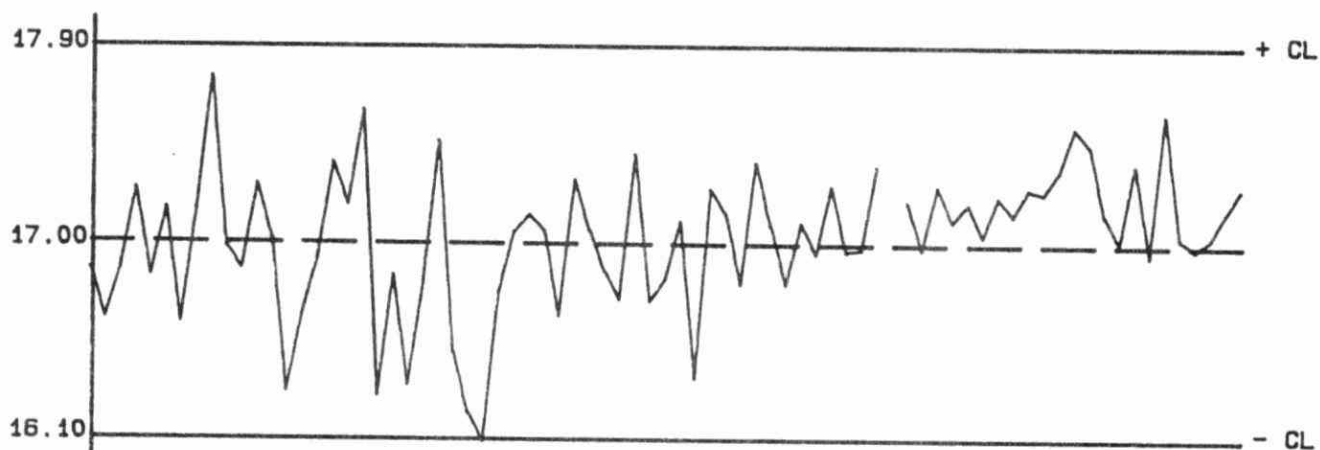
T value: 0.5

OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	77	0.00	0.000

QUALITY CONTROL GRAPHS SULPHATE (MG/L AS SO₄)

FROM: 24/04/86
TO: 24/12/86

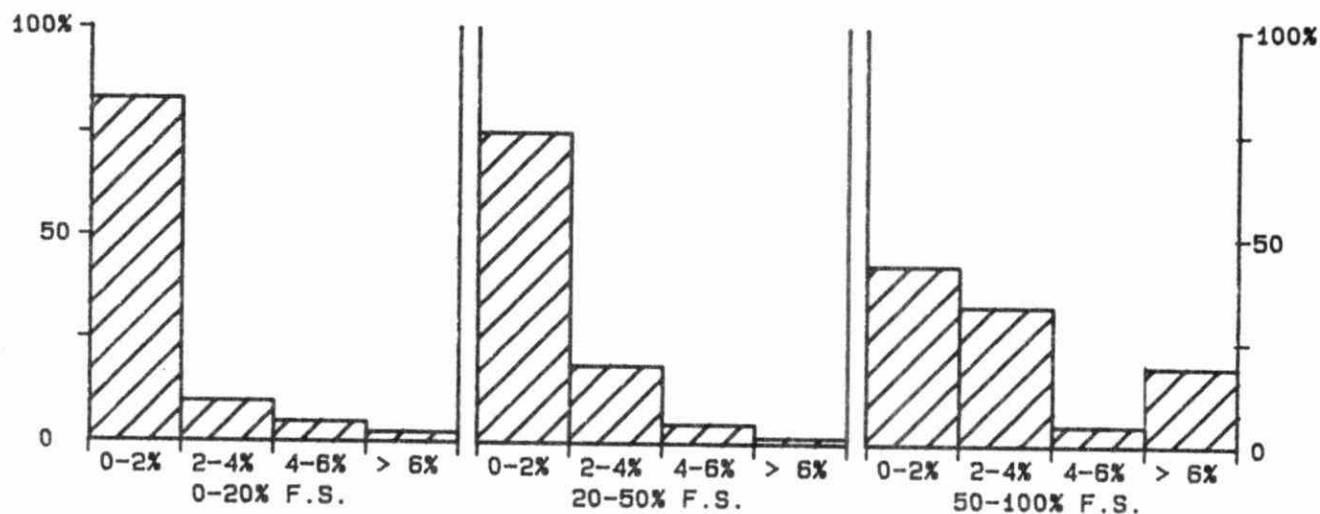


QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B

--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 20 MG/L AS SO₄

*** SULPHATE - SOIL (Xw) ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	SS04EW	Units	: ug/g as SO4
Work Station Code	: DOANIONX	Unit Code	: 073941
Method Code	: 301A15	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 10 g (dry <2 mm),
Container : glass or polystyrene jars

SAMPLE PREPARATION:

Air dried (<2 mm).

ANALYTICAL PROCEDURE:

Five grams of sample (<2 mm) is agitated for 60 minutes with 25 mL deionized water. Samples are centrifuged and the supernatant is filtered through a 0.45 um membrane filter. Sulphate is determined on the filtrate by ion chromatography.

INSTRUMENTATION:

Waters Model 430 Conductivity Detector
Spectraflow 400 solvent delivery system
Spectro-Physics SP780 XR autosampler
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 0.5** T value: 1

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration : 2 BL plus 2 standards, eg, QCA
Recovery : 3 long term soil samples representing different soil types plus
a round robin CSSC sample
Drift : 100% scale standard every 10 samples

MODIFICATION:

01/01/86 -Replacement of Wescan Ion Analyzer with equipment listed above
(Wescan columns used on both systems).
01/06/86 -Agitation of samples increased from 30 minutes to 1 hour.

SULPHATE - WATER EXTRACTABLE
QUALITY CONTROL DATA FROM 12/08/86 TO 08/09/86

Lab: Dorset Soils

Analytical Range: 2.5 to 100.0 ug/g

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	6	15.2	15.3	0.1	0.06
b :	7	7.2	7.4	0.2	0.10
a+b :	6	22.4	22.7	0.3	0.13
a-b :	6	8.0	7.9	-0.1	0.04

s.d.(AB): Sw(within run): 0.03 S(between runs): 0.08 S/Sw: 2.92

On any given day the calibration is accepted if the values obtained lie within the ranges:

14.9 to 29.9 for A+B
3.0 to 13.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	6	18.0	17.5	2.07
r2 :	7	50.0	50.6	3.47

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
12	0.0 - 20.0	0.44	4.5
2	20.0 - 50.0	0.46	1.2
0	50.0 - 100.0	N/A	N/A
14	Overall	0.44	N/A

STANDARD DEVIATION (s.dupl): 0.44

W value: 0.5

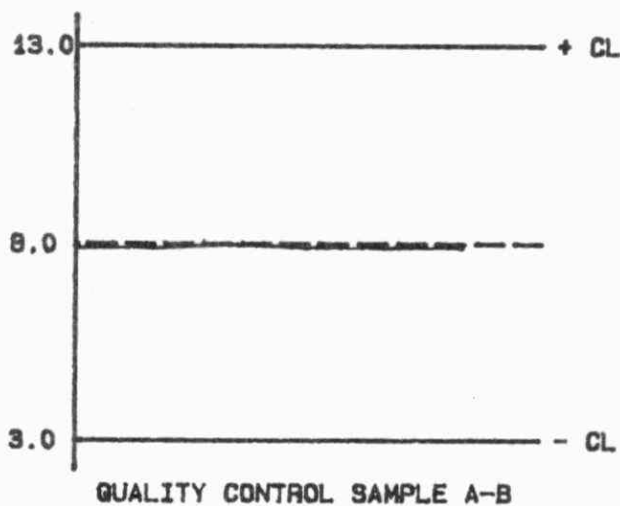
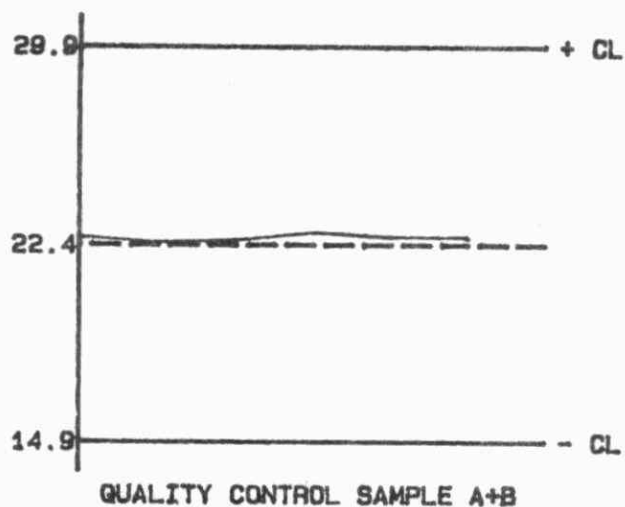
T value: 2.5

OTHER CHECKS:

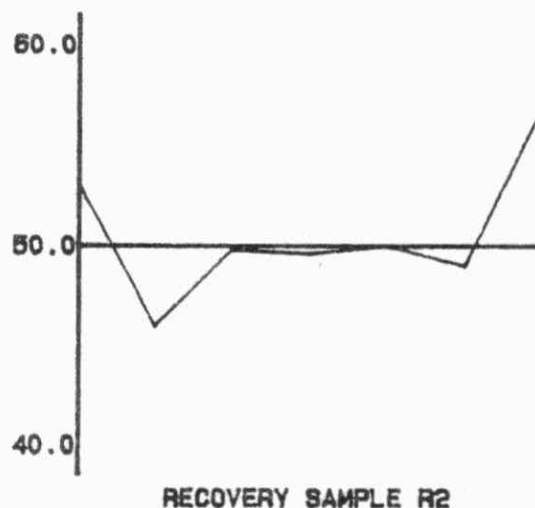
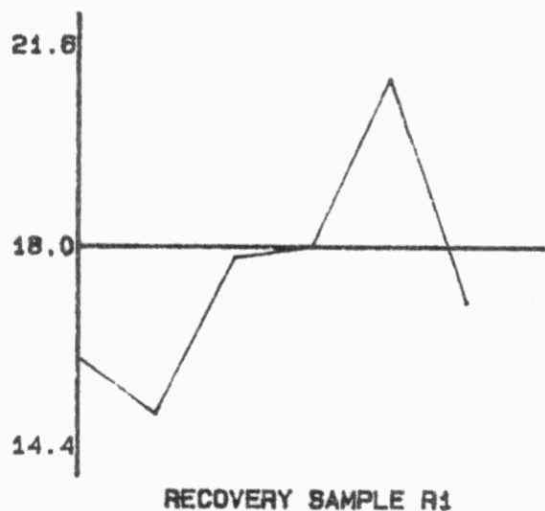
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	7	0.0	0.00

QUALITY CONTROL GRAPHS SULPHATE - WATER EXTRACTABLE (UG/G)

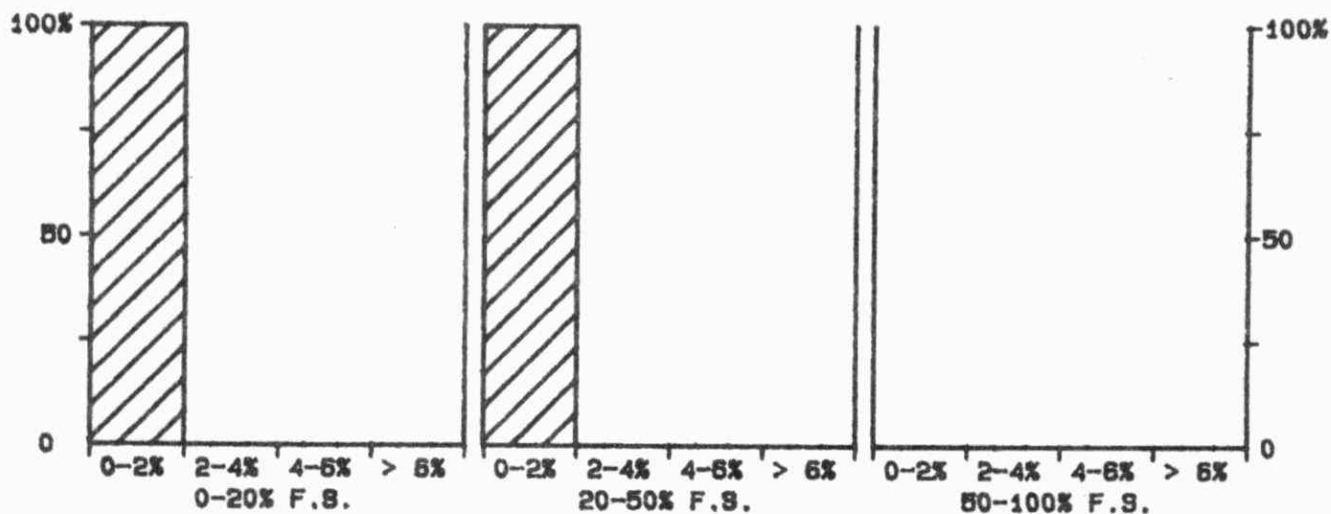
FROM: 12/08/86
TO: 08/09/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



IDENTIFICATION:

Laboratory : Ion Chromatography Method Introduced: 01/07/80
 LIS Test Name Code: SS02FR Units : ug/Filter as SO2
 Work Station Code : PRSEQ Unit Code : 361943
 Method Code : 004A10 Supervisor : F. Tomassini
 Sample Type/Matrix: Impregnated W41 filters from sequential and LoVol filter packs.

SAMPLING:

Quantity Required: 1 filter
 Container : Polyethylene bags
 Other : Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50 ml. of 0.05% H2O2 in polystyrene tubes with 1 hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO2 is converted to SO4 in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample extract by automated suppressed ion chromatography using an eluent mixture of 0.003M sodium bicarbonate and 0.0024M sodium carbonate with conductivity detection. Samples are spiked with Na2CO3/NaHCO3 to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO4 is determined by comparison of the sample scan to a series of standard scans. Results are converted to ug/filter as SO2.
 Full scale conductivity : 10 uS/cm.

INSTRUMENTATION:

-Mechanical shaker; ultrasonic bath; polyethylene tubes
 -Automated modular continuous flow ion chromatographic system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1.65** T value: 8.25

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : 2 standards, eg, QCA
 Drift : 1 standard every 10 samples

MODIFICATIONS:

01/07/80 -Ion chromatographic procedure for precipitation samples was modified for analysis of W41 filter extracts by developing the extraction procedure.
 10/03/84 -Microcomputer for automated sampling and timing was introduced. At that time automated spiking of samples with Na2CO3/NaHCO3 was introduced.
 15/03/84 -Streamlined procedure for extraction of W41 filters in one 50 mL polyethylene tube was adopted, eliminating two container transfers, and changing the extraction volume to 50.0 mL from 100.0 mL. Full scale reduced from 700 to 350ug/filter as SO2.

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHUR DIOXIDE
QUALITY CONTROL DATA FROM 03/01/86 TO 29/12/86

Lab: Ion Chromatography

Analytical Range: 8.25 to 350 ug/Filter as SO₂

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	169	268	268	0	3.6
b :	169	66	67	1	2.0
a+b :	169	334	335	1	3.8
a-b :	169	202	201	-1	4.4

s.d.(AB): Sw(within run): 3.1 S(between runs): 2.9 S/Sw: 0.94

On any given day the calibration is accepted if the values obtained lie within the ranges:

313 to 355 for A+B
 188 to 216 for A-B

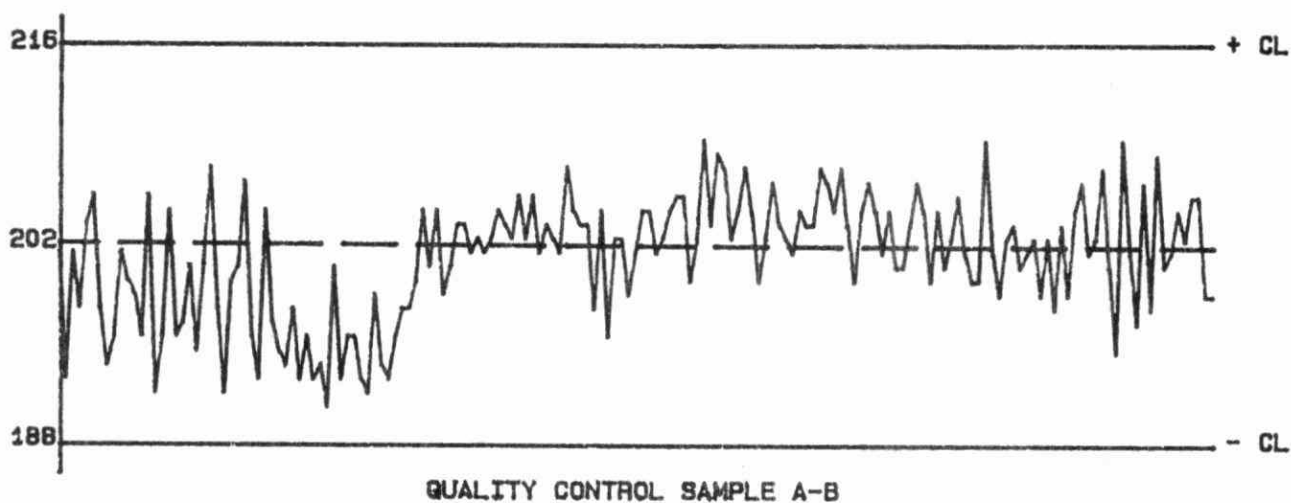
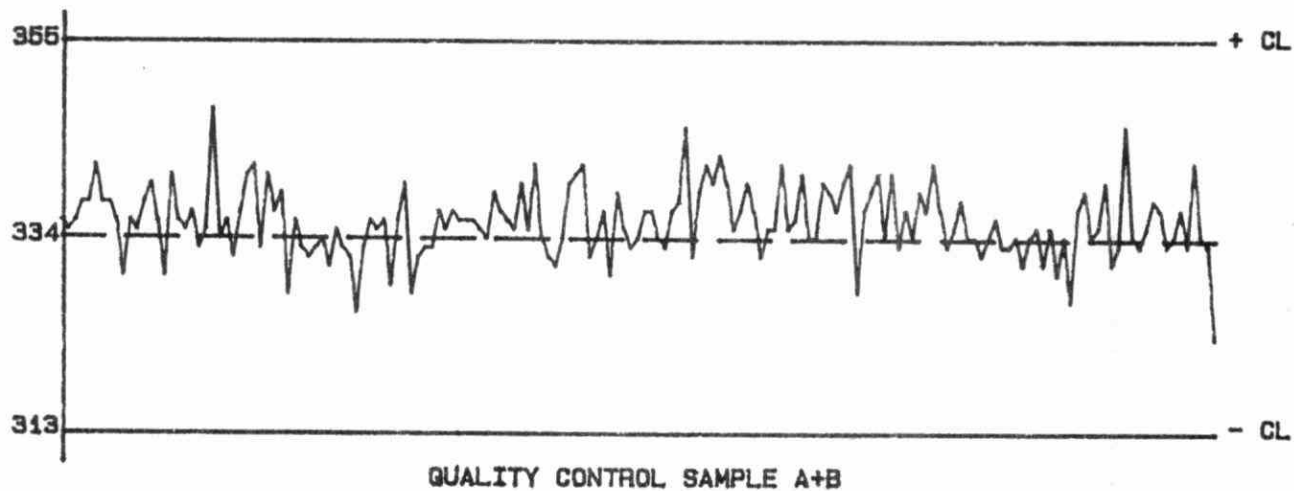
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
192	0.0 - 35.0	1.67	20.4
37	35.0 - 70.0	2.21	4.4
39	70.0 - 175.0	4.40	3.5
36	175 - 350	10.0	4.2
304	Overall	4.1	N/A

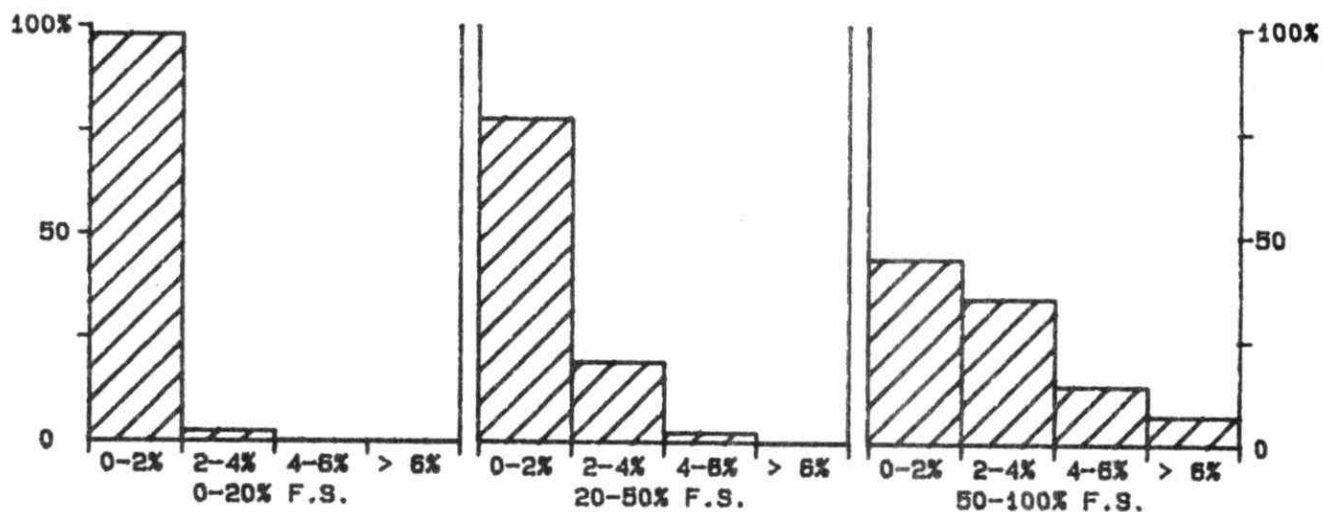
STANDARD DEVIATION (s.dupl): 1.67 W value: 1.65 T value: 8.25

QUALITY CONTROL GRAPHS SULPHUR DIOXIDE (UG/FILTER AS SO₂)

FROM: 03/01/86
TO: 29/12/86



— EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 350 UG/FILTER AS SO₂

*** TURBIDITY ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method Introduced:	01/04/74
LIS Test Name Code:	TURB	Units	: FTU
Work Station Code	: RMTURB	Unit Code	: 343000
Method Code	: 002A11	Supervisor	: P. Campbell
Sample Type/Matrix:	Rivers, Lakes, Effluents		

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with a sealed standard which is prepared commercially from latex polymers of known size and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

- Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration: B1 plus two standards, eg, QCA*

MODIFICATIONS:

01/04/82 -Hach 2100A turbidimeter was replaced by Hach ratio turbidimeter. As of this date samples are no longer stirred during turbidity measurements, and thus the effect of heavy particulates is minimized as they settle out before the reading is accepted.

01/08/85 -Controls QCA, QCB introduced: these controls are aqueous suspensions of beads composed of a styrene-divinylbenzene polymer and are formulated to "match" the performance of formazin standards on the Hach 18900 turbidimeter.
*Insufficient data collected for inclusion in performance report.

TURBIDITY
QUALITY CONTROL DATA FROM 04/01/86 TO 23/12/86

Lab: Solids and BOD

Analytical Range: 0.25 to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	110	18.0	17.9	-0.1	0.29
b :	110	1.80	1.88	0.08	0.036
a+b :	110	19.80	19.78	-0.02	0.297
a-b :	110	16.20	16.01	-0.18	0.285

s.d.(AB): Sw(within run): 0.20 S(between runs): 0.21 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.80 to 28.80 for A+B
 10.20 to 22.20 for A-B

DUPLICATES:	Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
	78	0.00 - 2.00	0.069	5.5
	199	2.0 - 20.0	0.26	4.0
	34	20 - 100	1.0	2.2
	1	100 - 200	N/A	N/A
	312	Overall	0.4	N/A

STANDARD DEVIATION (s.dup1): 0.069 W value: 0.05 T value: 0.25

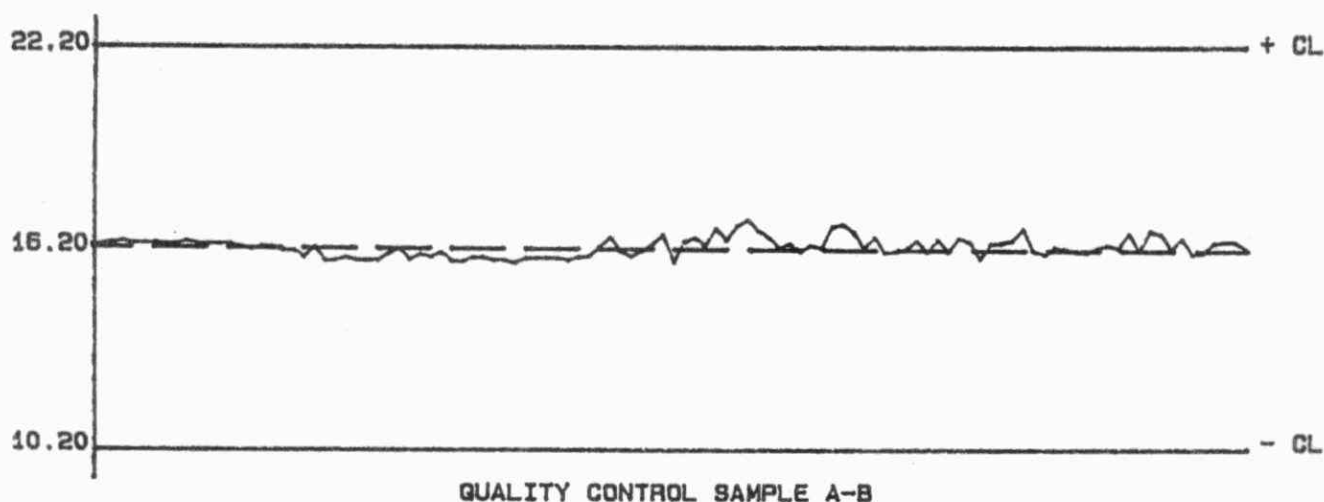
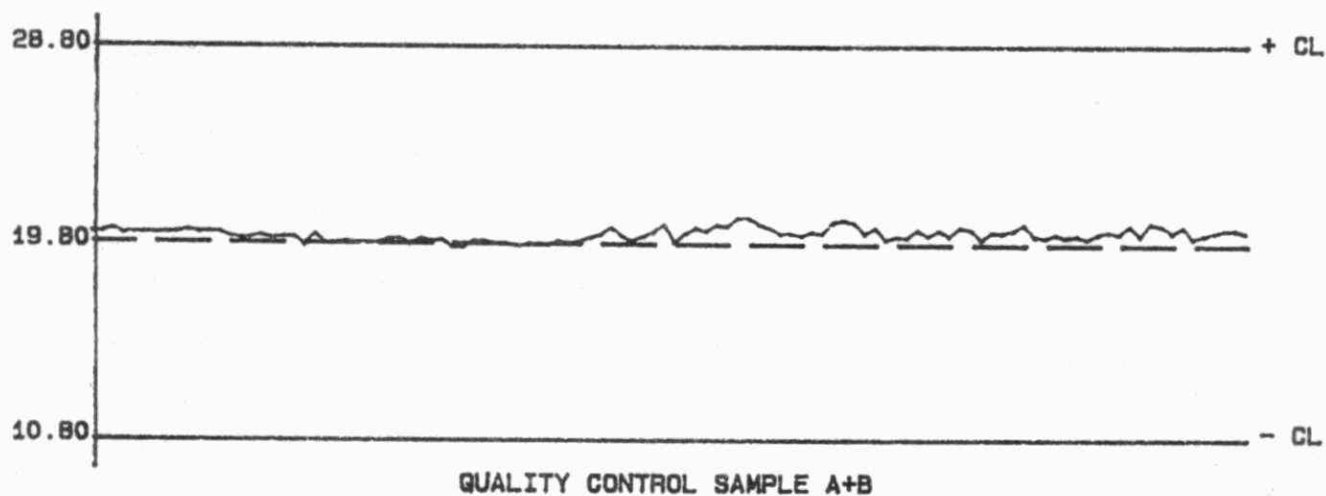
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	110	0.05	0.026

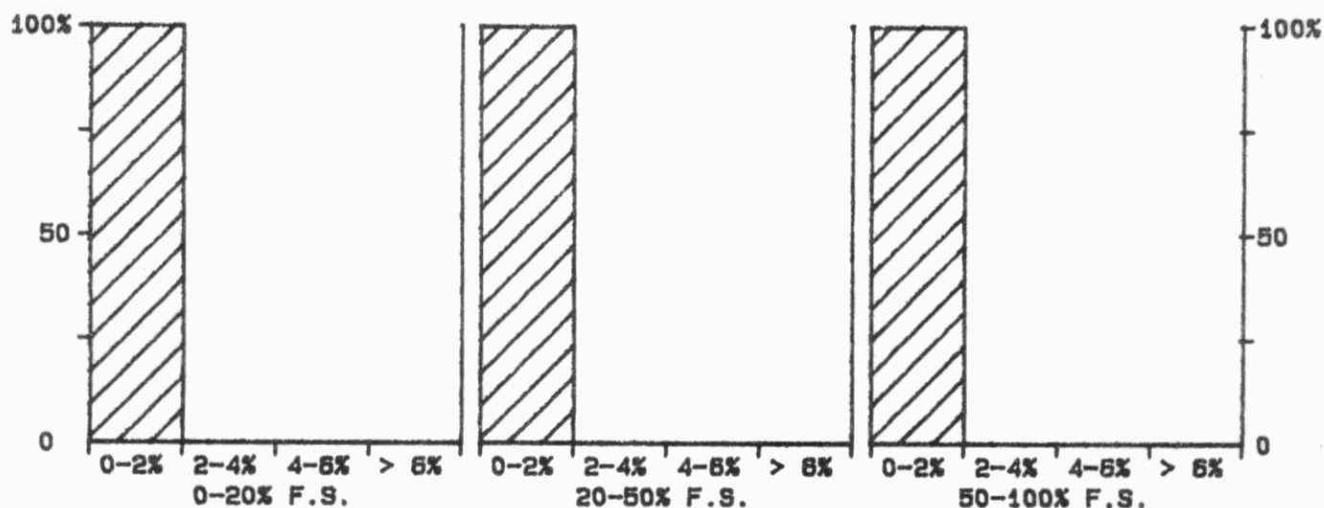
QUALITY CONTROL GRAPHS

TURBIDITY (FTU)

FROM: 04/01/86
TO: 23/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 FTU

*** TURBIDITY ***

IDENTIFICATION:

Laboratory	: Solids and BOD	Method	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: WTURB	Unit Code	: 343000
Method Code	: 002A11	Supervisor	: P. Campbell
Sample Type/Matrix: Domestic Water, Leachates, Effluents			

SAMPLING:

Quantity Required: 50 mL
Container : Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized periodically with freshly prepared formazin standards. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.02 T value: 0.1

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration: B1 plus two standards, eg, QCA *

MODIFICATIONS:

01/03/84 -Hach 2100A turbidimeter was replaced by Hach ratio turbidimeter. In the past samples were not stirred during turbidity measurements in the Domestic Water laboratory even though the former instrument (Hach 2100A) possessed this capability. Thus the effect of changing the instrumentation was minimal.

01/09/85 -Controls QCA,QCB introduced: These controls are aqueous suspensions of beads composed of a styrene-divinylbenzene polymer and are formulated to "match" the performance of formazin standards on the HACH 18900 turbidimeter.
*Insufficient data collected for inclusion in performance report.

TURBIDITY
QUALITY CONTROL DATA FROM 02/01/86 TO 24/12/86

Lab: Solids and BOD

Analytical Range: 0.1 to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	126	18.0	18.0	0.0	0.27
b :	126	1.80	1.82	0.02	0.027
a+b :	126	19.80	19.85	0.05	0.277
a-b :	126	16.20	16.21	0.01	0.256

s.d.(AB): Sw(within run): 0.18 S(between runs): 0.19 S/Sw: 1.06

On any given day the calibration is accepted if the values obtained lie within the ranges:

10.80 to 28.80 for A+B
 10.20 to 22.20 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
226	0.00 - 2.00	0.039	6.0
98	2.0 - 20.0	0.29	4.3
18	20 - 100	0.8	2.0
3	100 - 200	1.4	1.2
345	Overall	0.3	N/A

STANDARD DEVIATION (s.dupl): 0.039

W value: 0.02

T value: 0.1

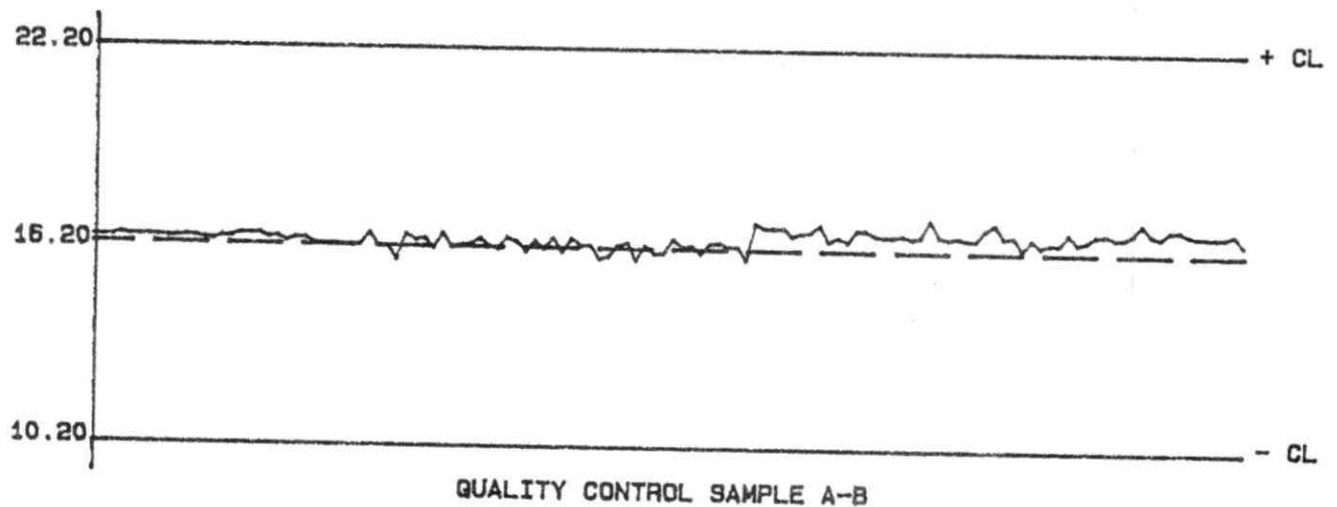
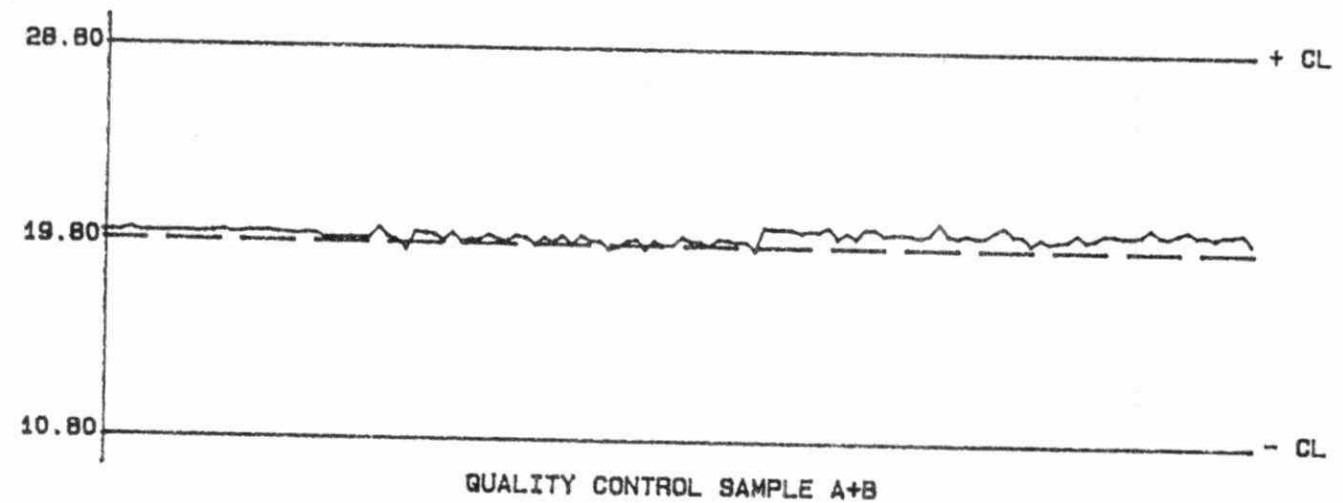
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	126	0.06	0.027

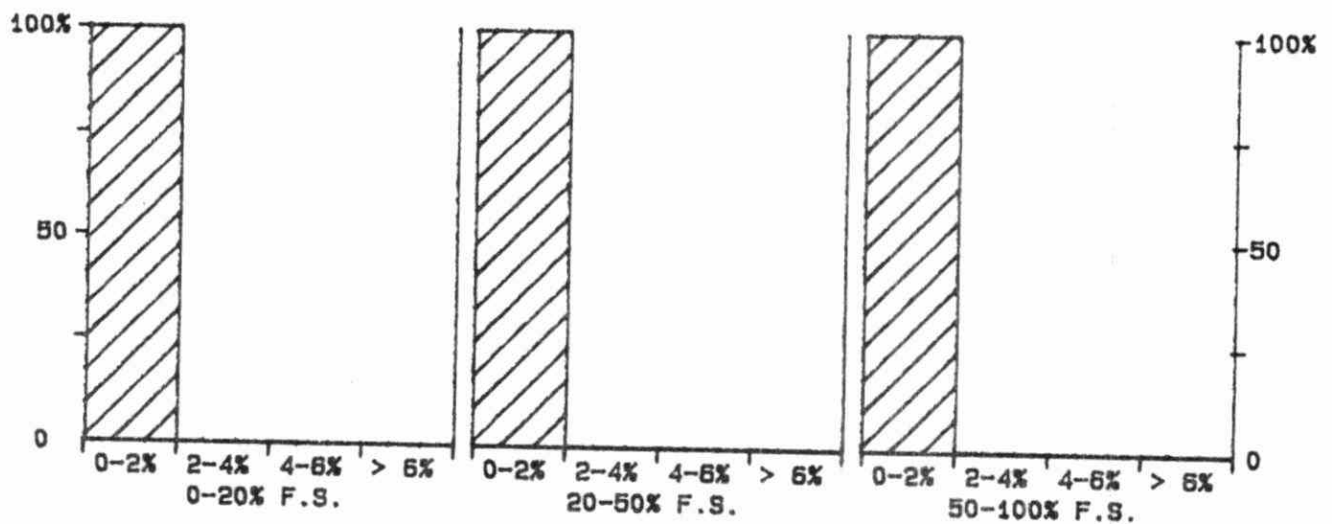
QUALITY CONTROL GRAPHS

TURBIDITY (FTU)

FROM: 02/01/86
TO: 24/12/86



--- EXPECTED VALUE
--- CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 200 FTU

*** TOTAL ZINC - SOIL ***

IDENTIFICATION:

Laboratory	: Dorset Soils	Method Introduced:	01/06/80
LIS Test Name Code:	ZNUT	Units	: ug/g as Zn
Work Station Code	: DOHMTE	Unit Code	: 073830
Method Code	: 551AA1	Supervisor	: A. Neary
Sample Type/Matrix:	Soil		

SAMPLING:

Quantity Required: 1 g (dry <150 um).
Container : Glass vial

SAMPLE PREPARATION:

Air dried and ground to <150 um.

ANALYTICAL PROCEDURE:

A 0.500 g sample (air dried and grounded) plus 7 mL nitric acid and 2 mL perchloric acid are heated at 125 C for 2 hours. The temperature is increased to 175 C and heating continues until 1 mL of liquid remains. The cooled sample is diluted to 25 mL with deionized water, allowed to settle and decanted. The supernatant is analyzed for Zn by AAS at 213.9 nm using an air-acetylene flame. Approximate absorbance: 0.3 at the full scale level. Copper, lead and nickel are determined simultaneously.

INSTRUMENTATION:

Varian AA1275 with programmable sample changer and Gilson Minipuls II pump
Balance accurate to 0.001 g

REPORTING:

Maximum Significant Figures: 2 Calculated W value: 1# T value: 5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration : Three long term soil samples representing different soil types,
2 method blanks, round robin CSSC samples.
Drift : 1 standard (100% F.S.) every 10 samples

MODIFICATIONS:

01/01/83 -Hot block temperature increased from 160 C to 175 C
06/01/86 -Samples analyzed on Varian 1275AAS (replacing Perkin Elmer 5000)

NOTES:

As silicate matrix is not destroyed, this method does not yield the "total" amount of the trace metal.
Values of recoveries are unknown--average value used.

TOTAL ZINC - SOIL
QUALITY CONTROL DATA FROM 22/08/86 TO 31/12/86

Lab: Dorset Soils

Analytical Range: 5 to 100.0 ug/g as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	0	75.0	N/A	N/A	N/A
b :	0	25.0	N/A	N/A	N/A
a+b :	0	100.0	N/A	N/A	N/A
a-b :	0	50.0	N/A	N/A	N/A

s.d.(AB): Sw(within run): N/A S(between runs): N/A S/Sw: N/A

On any given day the calibration is accepted if the values obtained lie within the ranges:

92.5 to 107.5 for A+B
 45.0 to 55.0 for A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn. Measured	Standard(1) Deviation
r1 :	6	36.1	34.9	1.17
r2 :	6	82.1	82.1	1.39
r3 :	6	38.5	35.5	2.37

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
1	0.0 - 20.0	N/A	N/A
7	20.0 - 50.0	2.00	5.3
6	50.0 - 100.0	1.71	2.6
14	Overall	1.81	N/A

STANDARD DEVIATION (s.dup1): 1.75

W value: 1

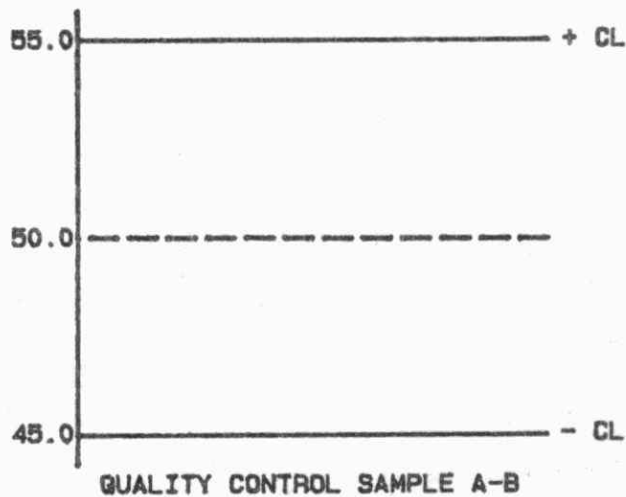
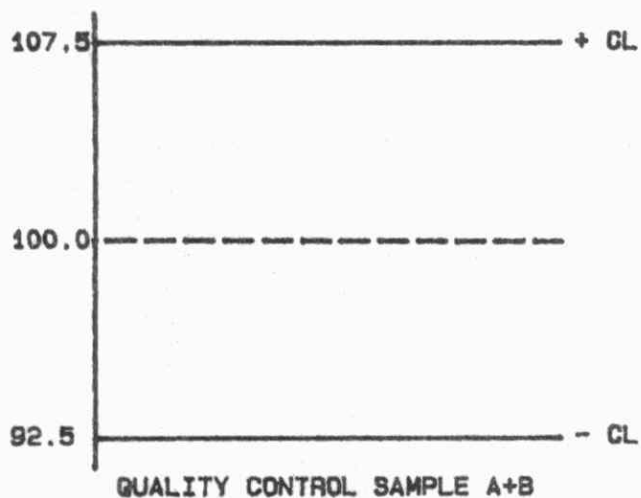
T value: 5

OTHER CHECKS:

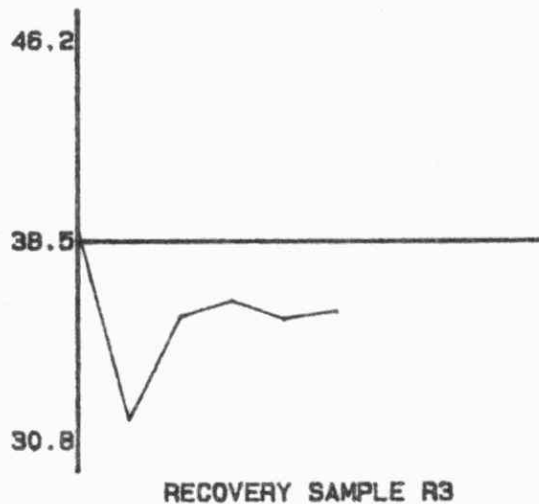
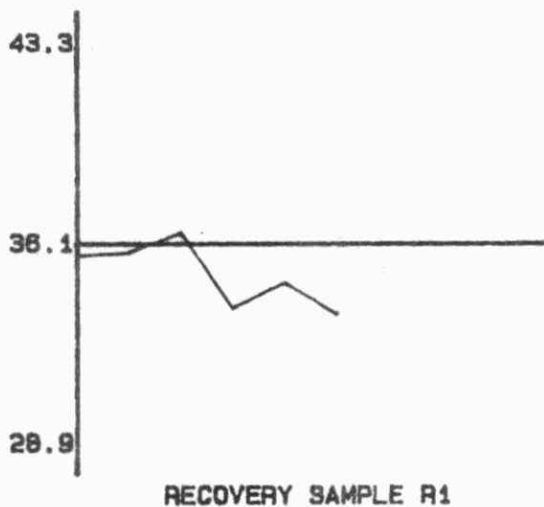
	Number of Data	Data Mean	Standard(1) Deviation
Digested Blank :	6	2.5	1.41

QUALITY CONTROL GRAPHS TOTAL ZINC - SOIL (UG/G AS ZN)

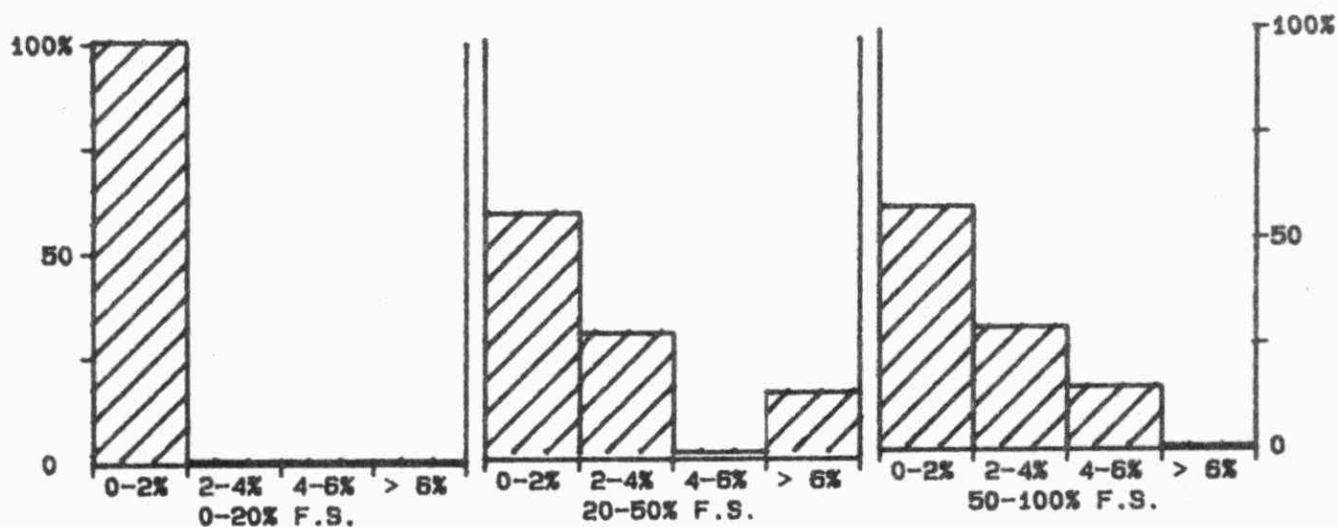
FROM: 22/08/86
TO: 31/12/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)



* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 100 UG/G AS ZN

*** ZINC ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	01/03/86
LIS Test Name Code:	ZNUT	Units	: ug/L as Zn
Work Station Code	: DOASV	Unit Code	: 063830
Method Code	: 001PP2	Supervisor	: F. Tomassini
Sample Type/Matrix:	Streams, Lakes, and Precipitation		

SAMPLING:

Quantity Required: 100 mL
Container : 500 mL, acid washed Nalgene polypropylene container, bagged
in a clean room

ANALYTICAL PROCEDURE:

Samples are acidified to 0.2% using Seastar nitric acid in a clean room. Oxygen is removed by nitrogen gas and samples are analyzed using anodic stripping voltammetry on a hanging mercury drop electrode. Change in current when zinc is stripped from mercury drop is proportional to concentration.

INSTRUMENTATION:

EG & G (Princeton Applied Research) Model 384 Analyzer with Model 303 Hanging Mercury Drop Electrode Standormetrohm 646 VA Processor with Model 675 VA Sample Changer.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

B1 plus 3 standards daily

CONTROLS:

Calibration: LTB plus 2 standards, eg, QCA
Duplicate : End of every run (approx. every 15 samples)

ZINC - TOTAL
QUALITY CONTROL DATA FROM 07/01/86 TO 04/09/86

Lab: Dorset

Analytical Range: 1 to 15.00 ug/L as Zn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
a :	67	8.00	6.97	-1.03	1.339
b :	67	2.00	2.00	-0.00	0.551
a+b :	67	10.00	8.97	-1.03	1.645
a-b :	67	6.00	4.97	-1.03	1.219

s.d.(AB): Sw(within run): 0.862 S(between runs): 1.024 S/Sw: 1.19

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.50 to 14.50 for A+B
3.00 to 9.00 for A-B

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
13	0.00 - 1.00	0.236	206.0
5	1.00 - 3.00	0.118	7.5
5	3.00 - 5.00	0.472	11.9
6	5.00 - 10.00	0.301	3.9
2	10.00 - 15.00	0.818	6.5
31	Overall	0.350	N/A

STANDARD DEVIATION (s.dupl): 0.236

W value: 0.2

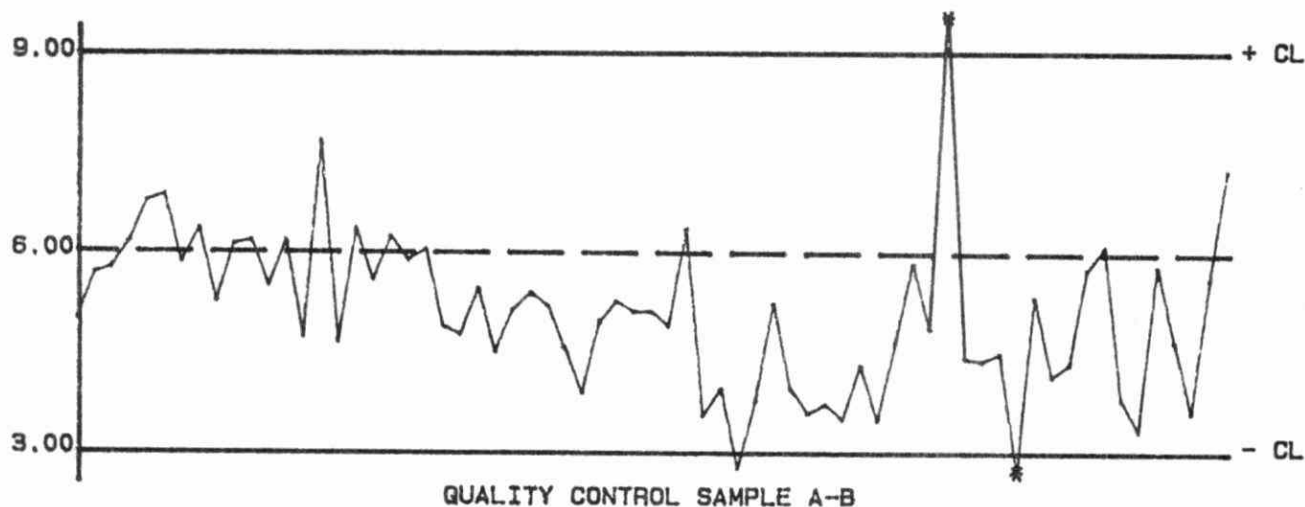
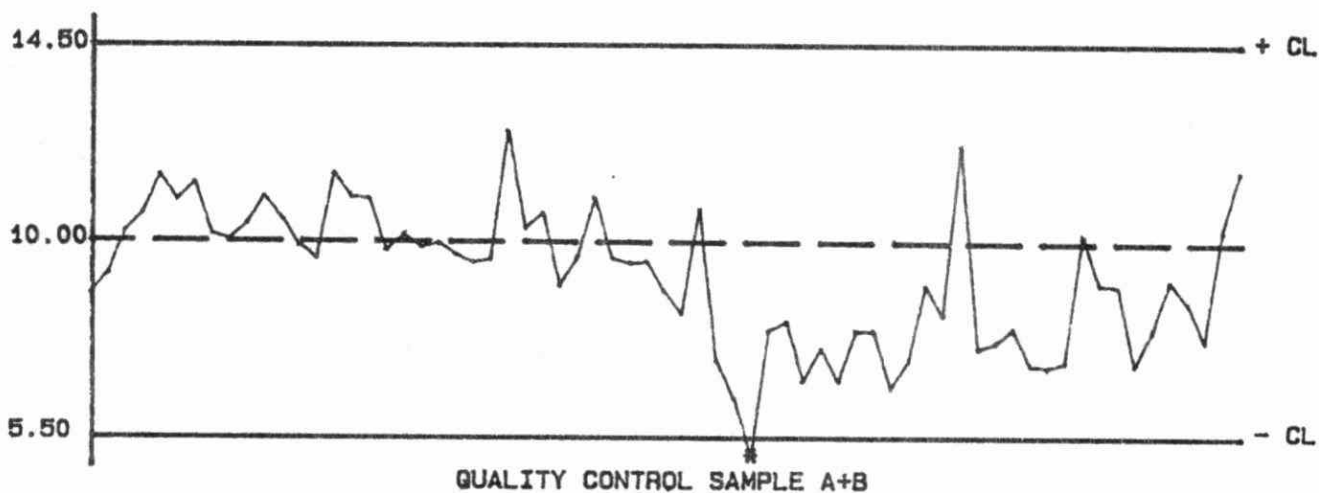
T value: 1

OTHER CHECKS:

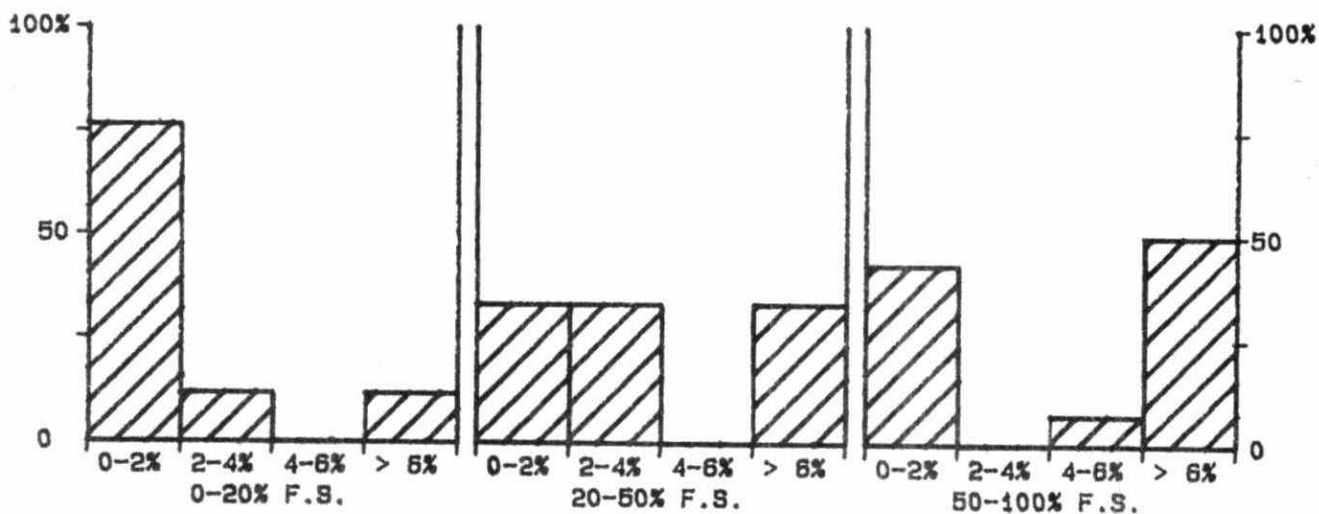
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank :	67	0.00	0.000

QUALITY CONTROL GRAPHS ZINC - TOTAL (UG/L AS ZN)

FROM: 07/01/86
TO: 04/09/86



--- EXPECTED VALUE
— CONTROL LIMIT (CL)
* DATA > 15% OUTSIDE CL



CONCENTRATION DIFFERENCE BETWEEN DUPLICATES
FULL SCALE VALUE (F.S.): 10 UG/L AS ZN

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GLOSSARY

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DW	- Distilled water
FTU	- Formazin Turbidity Units
g	- Gram
HAMES	- <i>"Handbook of Analytical Methods for Environmental Samples"</i> , M.O.E.
HOAC	- Acetic Acid
HZU	- Hazen Units
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
mil	- One-thousands of an inch
min	- Minute
mL	- Millilitre
mm	- Millimeter
N	- Normal
N/A	- Not Available or Not Applicable
nm	- Nanometer
oz	- Ounce
QC	- Quality Control
R	- Recovery
rpm	- Revolutions per minute
S	- Between run standard deviation for QC
S ₁	- Standard deviation
S ₂	- Standard deviation for duplicates

S _w	- Within run standard deviation for QC
S. class	- Weights that have not been certified
Standard Cal	- Colourimeter setting to control electronic expansion
STD	- Standard
TCU	- True Colour Units
u	- Micrometer
ueq	- Microequivalent
ug	- Microgram
uS	- Micro-Siemen
V/V	- Concentration based on volume measurements

APPENDIX

APPENDIX A

W & T:

Prior to 1985, W was the minimum detectable amount, and T was 1.645 times the standard deviation of duplicates in a concentration range of about 0-20% of full scale. The W value was given to the client to indicate the smallest amount that could be determined when the actual response was zero. In 1985, T was changed to three times the standard deviation of the same duplicates (reference 3). W was changed only where the minimum amount had changed. The increase in T was made to be consistent with recommendations by the American Chemical Society (reference 8) and to provide a level, above which, data users could have more than 99% confidence that a result obtained was above zero.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section now calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1, 2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active workstations, are contained in this report.

APPENDIX B

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Acidity - Gran.....	mg/L CaCO ₃	DOT.....	ACDG.....	1000.....	5.....	25
	ueq/L as H.....	PHACD.....	ACDG.....	1000.....	1.....	5
Acidity - TFE.....	mg/L CaCO ₃	DOT.....	ACDT.....	50.....	0.2.....	1
		PHACD.....	ACDT.....	100.....	0.05.....	0.25
Alkalinity-Gran.....	mg/L CaCO ₃	DOT.....	ALKTI.....	25.....	0.1.....	0.5
		RATS.....	ALKTI.....	25.....	0.1.....	0.5
Alkalinity-TFE.....	mg/L CaCO ₃	WALK.....	ALKT.....	500.....	0.2.....	1
		DOT.....	ALKT.....	80.....	0.1.....	0.5
		RATS.....	ALKT.....	250.....	0.2.....	1
		WATS.....	ALKT.....	250.....	0.2.....	1
Alk - TFE Q3.8.....	mg/L CaCO ₃	DOT.....	ALKT3.....	100.....	0.2.....	1
Aluminum - Xca.....	ug/g as Al.....	DOSOLAL.....	ALECA.....	40.....	0.5.....	2.5
Aluminum - CV.....	ug/L as Al.....	DOMISC.....	ALEXCV.....	1000.....	2.....	10
			ALNDCV.....	1000.....	2.....	10
Aluminum - Xdi.....	% wt as Al.....	DOMETDI.....	ALEDI.....	1.....	0.01.....	0.05
Aluminum - Xpy.....	% wt as Al.....	DOMETALX.....	ALEPY.....	0.5.....	0.01.....	0.05
Aluminum - Xsc.....	meq/100g Al.....	DOCATION.....	ALESC.....	2.5.....	0.02.....	0.1
Aluminum-Total.....	ug/L as Al.....	DOAAS.....	ALUT.....	200.....	1.....	5
Cadmium-Total.....	ug/L as Cd.....	DOAAS.....	CDUT.....	2.....	0.01.....	0.05
Calcium.....	mg/L as Ca.....	PRAA.....	CAUR.....	2.....	0.02.....	0.1
		RMAAS.....	CAUR.....	35.....	0.1.....	0.5
		WAAS.....	CAUR.....	175.....	0.2.....	1
		WCAMGH.....	CAUR.....	200.....	0.2.....	1
Calcium - Xca.....	meq/100g Ca.....	DOCATION.....	CAESC.....	5.....	0.02.....	0.1
Carbon-Diss Inor.....	mg/L as C.....	ROM.....	DIC.....	40.....	0.2.....	1
		ROC.....	DIC.....	40.....	0.2.....	1
		DODIC.....	DIC.....	10.....	0.02.....	0.1
Carbon-Diss Org.....	mg/L as C.....	ROM.....	DOC.....	20.....	0.2.....	1
		ROC.....	DOC.....	20.....	0.1.....	0.5
Carbon-Organic.....	% wt as C.....	DOOXMAT.....	ORGC.....	100.....	0.1.....	0.5
Chloride.....	mg/L as Cl.....	ROM.....	CLIDUR.....	50.....	0.2.....	1
				200.....	0.2.....	1
		RMSICL.....	CLIDUR.....	50.....	0.05.....	0.25
		WCL.....	CLIDUR.....	500.....	0.2.....	1
		PRIC1.....	CLIDUR.....	2.....	0.01.....	0.05
	ug/filt Cl.....	PRLOV.....	CLIDUR.....	100.....	1.....	5
Chlorophyll-a.....	ug/L.....	RCHLO.....	CHLRAT.....	10.....	0.2.....	1
Chlorophyll-acid.....	ug/L.....	RCHLO.....	CHLRAC.....	10.....	N/A.....	N/A
Chlorophyll-b.....	ug/L.....	RCHLO.....	CHLRBT.....	10.....	0.1.....	0.5
Clay.....	% bt wt.....	DOPARTSZ.....	CLAY.....	100.....	1.....	5
Colour - True.....	TCU.....	WCOL.....	COLTR.....	100.....	0.5.....	2.5
	HZU.....	DOCC.....	COLTR.....	100.....	1.....	5
Conductivity.....	uS/cm @25 ⁰	WPC.....	COND25.....	5000.....	N/A.....	N/A
		DOCC.....	COND25.....	300.....	0.2.....	1
		PRIC1.....	COND25.....	100.....	0.2.....	1
		COND-SEW.....	COND25.....	3000.....	5.....	25
		RATS.....	COND25.....	2000.....	1.....	5
		WATS.....	COND25.....	2000.....	1.....	5
Copper.....	ug/g as Cu.....	DOHMTTE.....	CUUT.....	25.....	0.5.....	2.5
Fluoride.....	mg/L as F.....	WFNO ₃	FFIDUR.....	2.....	0.01.....	0.05
	ug/L as F.....	DOSPF.....	FFIDUR.....	100.....	0.2.....	1

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Iron - Xdi.....	% wt as Fe.....	DOMETDI.....	FEEDI.....	2.....	0.02.....	0.1
Iron - Xpy.....	% wt as Fe.....	DOMETALX.....	FEEPY.....	1.....	0.005.....	0.025
Lead - Total.....	ug/g as Pb.....	DOHMTTE.....	PBUT.....	100.....	2.....	10
Lead.....	ug/L as Pb.....	DOASV.....	PBUT.....	2.....	0.1.....	0.5
Magnesium.....	mg/L as Mg.....	PRAA.....	MGUR.....	0.5.....	0.005.....	0.025
		RMAAS.....	MGUR.....	7.....	0.02.....	0.1
		WAAS.....	MGUR.....	35.....	0.1.....	0.5
		WCAMGH.....	MGUR.....	80.....	0.1.....	0.5
Magnesium-Xsc.....	meq/100g Mg.....	DOCACTION.....	MGESC.....	2.5.....	0.01.....	0.05
Nickel - Total.....	ug/g as Ni.....	DOHMTTE.....	NIUT.....	200.....	1.....	5
Nitrogen-NH ₃ +NH ₄	mg/L as N.....	PRNUT.....	NNHTFR.....	5.....	0.005.....	0.025
			NNHTUR.....	5.....	0.005.....	0.025
		RNDNP.....	NNHTFR.....	2.....	0.002.....	0.01
		SDNP.....	NNHTFR.....	50.....	0.1.....	0.5
	ug/L as N.....	DONUT.....	NNHTFR.....	1000.....	1.....	5
	ug/filt N.....	PRSEQ.....	NNHTFR.....	125.....	0.125.....	0.625
Nitrogen - NO ₃	ug/filt N.....	PRSEQ.....	NNO3FR.....	50.....	0.25.....	1.25
	mg/L as N.....	PRIC1.....	NNO3UR.....	2.....	0.01.....	0.05
	ug/filt N.....	PRLOV.....	NNO3UR.....	100.....	0.5.....	2.5
Nitrogen-NO ₃ +NO ₂	mg/L as N.....	RNDNP.....	NNOTFR.....	5.....	0.02.....	0.1
		SDNP.....	NNOTFR.....	50.....	0.1.....	0.5
		WFNO3.....	NNOTUR.....	20.....	0.1.....	0.5
	ug/L as N.....	DONUT.....	NNOTFR.....	500.....	2.....	10
Nitrogen - NO ₂	mg/L as N.....	RNDNP.....	NNO2FR.....	0.25.....	0.001.....	0.005
		SDNP.....	NNO2FR.....	2.....	0.005.....	0.025
Nitrogen-T Kjdl.....	mg/L as N.....	RTNP.....	NNTKUR.....	2.....	0.02.....	0.1
		STKNP.....	NNTKUR.....	25.....	0.05.....	0.25
Oxygen - BOD.....	mg/L as O.....	SBBOD5.....	BOD5.....	400.....	0.2.....	1
Oxygen - COD.....	mg/L as O.....	RCOD.....	COD.....	100.....	1.....	5
			CODF.....	100.....	1.....	5
		SBCOD.....	COD.....	500.....	2.....	10
pH.....		DOCOP.....	PH.....	14.....	N/A.....	N/A
		DOT.....	PH.....	14.....	N/A.....	N/A
		SBPH.....	PH.....	14.....	N/A.....	N/A
		PHACD.....	PH.....	14.....	N/A.....	N/A
		RATS.....	PH.....	14.....	N/A.....	N/A
		WATS.....	PH.....	14.....	N/A.....	N/A
		WPC.....	PH.....	14.....	N/A.....	N/A
pH - Soil Xca.....		DOSOILPH.....	PHECA.....	9.....	N/A.....	N/A
pH - Soil Xw.....		DOSOILPH.....	PHEW.....	9.....	N/A.....	N/A
Phenolics.....	ug/L Phenol.....	ROPHEN.....	PHNOL.....	50.....	0.2.....	1
Phosphorus-Sol.....	mg/L as P.....	RNDNP.....	PPO4FR.....	0.125.....	0.0005.....	0.002
		SDNP.....	PPO4FR.....	10.....	0.02.....	0.1
Phosphorus-Tot.....	mg/L as P.....	RTNP.....	PPUT.....	0.2.....	0.002.....	0.01
		STKNP.....	PPUT.....	5.....	0.02.....	0.1
	ug/L as P.....	DOP.....	PPUT1.....	200.....	0.2.....	1
Potassium.....	mg/L as K.....	PRAA.....	KKUR.....	1.....	0.01.....	0.05
		RMAAS.....	KKUR.....	10.....	0.02.....	0.1
		WAAS.....	KKUR.....	50.....	0.1.....	0.5
		WNAK.....	KKUR.....	40.....	0.05.....	0.25
	ug/filt K.....	PRLOV.....	KKUR.....	50.....	0.5.....	2.5
Potassium-Xsc.....	meq/100g K.....	DOCACTION.....	KKESC.....	0.75.....	0.01.....	0.05
Sand.....	% by weight.....	DOPARTSZ.....	SAND.....	100.....	1.....	5

PARAMETER	UNITS	WORK STATION	TEST CODE	FULL SCALE	W	T
Silicon.....	mg/L as Si.....	ROM.....	SIO3UR.....	10.....	0.1.....	0.5
		RMSICL.....	SIO3UR.....	10.....	0.02.....	0.1
Silt.....	% by weight.....	DOPARTSZ.....	SILT.....	100.....	1.....	5
Sodium.....	mg/L as Na.....	PRAA.....	NAUR.....	1.....	0.01.....	0.05
		RMAAS.....	NAUR.....	20.....	0.02.....	0.1
		WAAS.....	NAUR.....	100.....	0.2.....	1
		WNAK.....	NAUR.....	200.....	0.2.....	1
	ug/filt Na.....	PRLOV.....	NAUR.....	50.....	0.5.....	2.5
Solids - Diss.....	mg/L.....	RMTSD.....	RSF.....	1000.....	N/A.....	N/A
		SOLIDS.....	RSF.....	3000.....	5.....	25
Solids - Ign.....	mg/L.....	SOLIDS.....	RSFA.....	3000.....	10.....	50
			RSPA.....	3000.....	5.....	25
			RSTA.....	30000.....	20.....	100
Solids - Part.....	mg/L.....	RMTSD.....	RSP.....	1000.....	0.2.....	1
		SOLIDS.....	RSP.....	3000.....	1.....	5
Solids - Tot.....	mg/L.....	SOLIDS.....	RST.....	60000.....	10.....	50
Sulphate.....	ug/filt SO ₄	PRSEQ.....	SSO4FR.....	250.....	1.25.....	6.25
			SSO4NF.....	250.....	1.25.....	6.25
	mg/L as SO ₄	WSO4.....	SSO4UR.....	100.....	N/A.....	N/A
		PRIC1.....	SSO4UR.....	10.....	0.05.....	0.25
	ug/filt SO ₄	PRLOV.....	SSO4UR.....	500.....	2.5.....	12.5
	mg/L as SO ₄	RMDSO4.....	SSO4UR.....	200.....	0.5.....	2.5
				20.....	0.1.....	0.5
Sulphate - Xw.....	ug/g as SO ₄	DOANIONX.....	SSO4EW.....	100.....	0.5.....	2.5
Sulphur Dioxide.....	ug/filt SO ₂	PRSEQ.....	SSO2FR.....	350.....	1.65.....	8.25
Turbidity.....	FTU.....	RMTUB.....	TURB.....	200.....	0.05.....	0.25
		WTUB.....	TURB.....	200.....	0.02.....	0.1
Zinc - Tot.....	ug/g as Zn.....	DOHMTTE.....	ZNUT.....	100.....	1.....	5
Zinc.....	ug/L as Zn.....	DOASV.....	ZNUT.....	15.....	0.2.....	1